The prevalence of selected risk factor for non-communicable diseases among 25-74 year old urban citizens of Yangon Region, Myanmar

Aung Soe Htet

Supervisor:

Professor Espen Bjertness, Ph.D

Head of section for Preventive Medicine and Epidemiology

Department of Community Medicine, University of Oslo

Co-supervisors:

(1) Professor Win Myint Oo, Ph.D

Head of the department of Preventive and Social Medicine

University of Medicine (I), Yangon

(2) Dr. Lhamo Y. Sherpa, Ph.D

Section for Preventive Medicine and Epidemiology

Department of Community Medicine, University of Oslo

Department of Community Medicine

Institute of Health and Society

Faculty of Medicine

University of Oslo, Norway

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Abbreviation

BMI	Body Mass Index (BMI)
BP	Blood Pressure
CHD	Coronary Health Diseases
CI	Confident Intervals
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DALYs	Disability adjusted life years
DBP	Diastolic blood pressure
DM	Diabetes Mellitus
HDL	High density lipoprotein cholesterol
LDL	Low density lipoprotein cholesterol
MET	Metabolic equivalent of tasks
NCD	Non-communicable disease
NGO	Non-governmental Organization
SBP	Systolic blood pressure
SEAR	South-East Asia Region
SPSS	The statistical package for Social scientists
TC	Total cholesterol
TG	Triglycerides
UN	United Nations
USD	United States Dollar
WC	Waist circumference
WHO	World Health Organization
WHR	Waist-to-hip ratio

Abstract

Aim: The purpose of the study was to estimate the prevalence of selected modifiable risk factors of non-communicable diseases (NCDs), smoking, alcohol consumption, physical inactivity, fruits and vegetables consumption, overweight and obesity, hypertension, diabetes and abnormal lipid profiles, and to investigate the association between hypercholesterolemia with selected socio-demographic factors and selected NCD risk factors among 25-74 year old citizens of urban area of Yangon Region, Myanmar.

Materials and Methods:

A household based cross sectional study conducted in urban area of Yangon region, Myanmar with multi-stage cluster sampling of 758 participants who were 25-74 years old. The methodology was adapted to the WHO STEPwise approach to chronic disease risk factor surveillance. In STEP (1), socio-demographic characteristics and NCD risk factors were undertaken by questionnaire. In STEP (2) physical anthropometric measurements and blood pressure were measured, and in STEP (3), fasting lipid profiles and blood glucose were investigated.

Result:

The main findings of the present study was high prevalence of NCDs risk factors, low intake of fruits and vegetables consumption (82.3%), overweight (44%), hypertension (48.2%), diabetes (18%), and based on Framingham risk scores, 33.2% of males and 22.2% of females had a moderate to high risk of developing CHD the next 10 years. Furthermore, an alarming high prevalence of hypercholesterolemia of 56.6% was reported. In multivariable analysis, high age, low education, low income and tobacco use were associated with hypercholesterolemia. 32 % of the total respondents lived with three or more risk factors of NCDs among the study population.

Conclusion:

The present study shows that the prevalences of NCD risk factors in the urban population of the Yangon region are generally high. Compared with a previous study from the same area conducted in 2003, the prevalences of the risk factors seem to be on rise. These were gender differences with high prevalence in males than females for smoking, current alcohol drinking, and hypercholesterolemia, and lower prevalence for males regarding overweight and obesity.

Almost all adult urban citizens of Yangon have more than one the risk factors present, and one third has 3-5 risk factors present. Based on the Framingham risk estimates, more that one-fourth of the population have moderate to high risk of developing CHD within the next 10 years.

The present study indicates social inequity in the occurrence of hypercholesterolemia which is higher among those with low income and education. An increasing trend in NCD risk factors will lead to increase in NCDs. This will put an enormous pressure on the Myanmar health system, and prevention strategies should be given high priority.

Keywords: risk factors, non-communicable diseases, prevalence, Yangon, Myanmar

CHAPTER I

BACKGROUND AND INTRODUCTION

(I) BACKGROUND

1. Background of the Republic of the Union of Myanmar

1.1 Geography

The Republic of the Union of Myanmar, previously known as Burma, is the largest country in the South-East Asia region. It is bordered on the north and north-east by China, on the east and south-east by Laos and Thailand, on the south by the Andaman Sea and the Bay of Bengal and on the west by Bangladesh and India [1]. The country's extensive coastline, stretching from southern to northwestern parts of the country, provides access to sea routes and marine resources [1]. Flat land areas, which are enclosed within the mountain barriers, are mostly agricultural land with high population density. Myanmar is often called "The Golden land", because of its golden paddy fields and pagodas.

1.2 Demography

The total population of Myanmar is estimated to be 60 million people. About 70% of the population lives in rural areas[1]. However, the urban population has been growing rapidly by 2.5 % annually [2]. The annual growth rate was estimated to be 1.01%(2012) [1].

Approximately one-third was under 14 years old; 25-59 year age-groups accounted for 62%, and 8.8 % was 60 years and above [1]. The sex ratio was estimated to be 98.8 males per 100 females in 2011 [1]. The population density varies between states and regions, Yangon region was the highest densely populated area (666 persons per square kilometers of land) and the mountainous Chin state was the most sparsely populated area (88 persons per square kilometers of land) [3]. The national poverty index reported a decline in poverty from 32% in 2005 to 26% in 2010, with a greater decrease in urban than in rural areas [4].

The official language in Myanmar is Burmese [1]. Myanmar, however, has 135 national ethnic groups and more than 100 languages and dialects [1]. Myanmar is known as a Buddhist country with 89 % of people being Buddhists [1]. The others are Christians (4.9%), Muslims (3.9%), Hindus (0.5%) and Animists (1.2)% [1].

1.3 General Health Status of Myanmar

Under the guidance of the National Health Committee (NHC), the Ministry of Health takes the responsibility of providing preventive, curative and rehabilitative services in order to raise the health status of the entire population. At township level, health services are provided by

the township hospital, station hospitals, urban and rural health centers and sub-rural health centers. The health professionals at community levels provide health services using a primary health care (PHC) approach with the participation of voluntary health workers such as auxiliary midwives and community health workers [5].

However, understaffing at various levels have been a major problem in public health care system regarding issues of access and coverage [5]. The distribution of government medical doctors across states and divisions varied from 6 to 59 per 100,000 populations and that of nurses vary from 10 to 160 per 100,000 populations [5]. Yangon and Mandalay regions, had the highest concentration of medical doctors in 2009 [5].

The Myanmar Health care system has a pluralistic mix of public and private system both in the financing and service provision [5]. Both public and private service providers are involved in the health care system throughout the country. Government health expenditures have increased annually on both current and capital from 1.0% in 2010-2011 to 3.1% in 2012-2013 of the total government expenditures [1]. The world health organization (WHO) estimated that the health expenditure per capita increased in Myanmar from 2.8 USD in 2002 to 19.8 USD in 2012 [6]. Myanmar national death rate at 900 deaths per 100,000 populations stood among the highest in the South-East Asian countries, while the gross national income was at the lowest [7]. In general, there are three main financial sources namely public, private and external sources contributing in Myanmar health expenditures [8].

The average life expectancy of Myanmar people has increased gradually from 54.4 years in 1990 to 60.7 years in 2010 [9]. Since the people tend to live longer, their probability of getting non-communicable and chronic diseases also increases with age.

1.4 Non-communicable diseases

Non-communicable diseases (NCDs) are globally the leading causes of morbidity and mortality. WHO defines NCDs as “diseases of long duration, and with generally slow in progression” [10]. However, the threat of NCDs to today’s world is not slow in progression.

In 2010, NCDs were responsible for 65% of the global deaths (34.5 million deaths) [11] and 54% of disability-adjusted life years (DALYs) worldwide [12]. The figures are expected to increase to 73% and 60% respectively by the year 2020 [10]. More than 80% of NCD deaths

occurred within low and middle income countries, and nearly one out of four deaths occurred before the age of 60 years in 2008 [13].

NCDs contributed globally four out of the top five leading causes of death in 2010: ischemic heart disease (first), stroke (second), chronic obstructive pulmonary diseases (COPD)(third), and lung cancer (fifth); in the South-East-Asia region: ischemic heart disease (first), stroke (second), Diabetes (fifth) [11]. The South-East Asia region is facing an epidemic of NCDs causing 7.9 million deaths or 55% of total deaths[13]. One-third occurred before age 60 [13]. It is reported that NCDs in South-East Asia region is on rise, however in Myanmar, data on NCDs is scarce.

The burden of diseases estimates for Myanmar indicates increasing trends of NCDs from 1990-2010: stroke (35% increase), ischemic heart disease (41% increase), diabetes mellitus (39% increase), hypertensive heart disease (21% increase), and lung cancer (54% increase) [14]. In Myanmar, NCDs were reportedly to be the most common causes of deaths in 2008, contributing 40% of all deaths [13]. About 30% of NCD related deaths occurred before the age of 60 [15].

Globally, there is a shift in disease pattern from infectious diseases to chronic diseases due to a more westernized lifestyle and urbanization. The risk factors of NCDs include low education, stress, tobacco use, unhealthy diet, physical inactivity, overweight and obesity, and biological risk factors such as high blood glucose, high blood pressure and abnormal blood lipid profile [10]. These factors are interlinked with each other and linked with urbanization, poverty and globalization [10]. An increasing trend in NCDs risk factors has been observed globally during the two decades from 1990 to 2010; blood pressure (27% increase), smoking (3% increase), alcohol use (28% increase), low fruit (29% increase), high body-mass index (82% increase), and high fasting plasma glucose(58% increase) [16]. An increase in such risk factors may lead to raised NCDs' burden.

In 2012, the World Health Assembly endorsed the United Nations(UN) political declaration on non-communicable diseases to reduce 25% of avoidable NCD-related mortality by 2025 (the 25 by 25 goal) [17]. It provided a greater political attention to NCDs globally. Many high income countries have managed to reduce the mortality of NCDs with major investments in prevention and treatment programs of NCDs [18,19]. However, low-income countries still face

huge challenges to control the rise in NCDs with their limited resources. Myanmar, like other least-developed countries, encounters double burden of diseases. It therefore was suggested to perform a stepwise approach to NCD planning and action as an appropriate method particularly for middle-income and low-income countries, to meet UN commitments on NCDs [20]. For this strategy, the estimation of the burden of NCDs and their risk factors were crucial for planning an effective national health policy for NCDs [20].

It has been reported that mitigating common modifiable risk factors can reduce 80% of cardiovascular diseases and diabetes, and 40 % of cancers [21]. Rapid and substantial reduction in mortality can be achieved from the improvement of risk factors of NCDs in a population [22]. Unhealthy diet, tobacco use, high blood pressure and high blood glucose were found to be among the top five risk factors contributing to most of the disease burden in Myanmar [14].

Currently, there are two studies on NCD-risk factors from Myanmar. A WHO STEPs survey in Yangon region conducted in 2003-2004 and a nationwide WHO STEPs survey undertaken in 2009. These studies provided information on risk behaviors such as tobacco use, alcohol consumption, and physical risk factors such as obesity and hypertension. Biochemical measurements i.e. fasting blood glucose and lipids were also investigated in 2003-2004[23], but not in 2009 [24].

1.5 Risk factors of non-communicable diseases

1.5.1 Tobacco Use

Tobacco use is a risk factor for a number of chronic diseases including various cancers, in particular lung cancer, and heart disease, stroke, COPD and diabetes [25,26]. In spite of being avoidable, tobacco is related to 6 million deaths every year [27]. Tobacco consumption including second-hand smoking takes up second top position in both global and South-East Asia region when risk factors are ranked by attributable burden of diseases [16]. Moreover, the South-East Asia Region has the highest tobacco consumption, consuming 8% of world cigarette production (488 billion cigarettes) in 2007 [28].

Smokeless tobacco use, such as tobacco chewing may lead to cancers, cardiovascular disease (CVD) and other circulatory diseases [29,30]. Tobacco chewers have more than 10 times higher risk of oral cancer than non-users [31]. Betel quid chewing and smoking is reported to be associated with oral cancer and pre-cancer in Myanmar [32]. In Myanmar, the prevalence of

smokeless tobacco use was 30% (51% among males and 16% among females) while the overall prevalence of smoking was 22 % (45 % among males and 8 % among females) in 2009[24]. Second hand smoking was prevalent at 55 % in homes and 39 % at workplaces [24]. The Global Health Professions Student survey (GHPSS) of Myanmar in 2007 indicated that 22 % of dental students, 12 % of medical students, 4 % of pharmacy students currently smoked cigarettes and 13 % of dental students, 11 % of medical students and 4 % of pharmacy student used other form of tobacco products [33].

1.5.2 Alcohol Consumption

Harmful use of alcohol causes about 2.5 million deaths globally each year [34]. Alcohol drinking is a leading risk factor of disease burden of both developed and developing countries[34]. Apart from the direct effects of intoxication and addiction, harmful use of alcohol consumption causes esophageal cancer, liver diseases, CVDs, road traffic accidents and homicide [34]. Although light and moderate consumption of alcohol beverage have protective effect on cardiovascular diseases and diabetes[35-37], the overall impact of the burden of disease is harmful [25].

An estimated 350,000 people died in South-East Asia region in 2004 [13], and alcohol consumption was ranked by attributable burden of disease 2012 as the highest 6th in South-East-Asian region and highest 3rd position globally [16]. A recent study reported a higher prevalence of alcohol consumption among males than among females in the South-East Asia Region [10]. A similar trend is seen in Myanmar. Local spirit, whisky, beer, seasonal palm juice, and wine are common beverages in Myanmar. The 2009 survey reported that the prevalence of current drinkers in the last 30 days was 13% and there were substantial differences in alcohol consumption between males (31%) and females (1.5%). However, 35 % of males and 95% of females were found to be life-abstainers [24].

1.5.3 Fruits and Vegetables consumption

Urbanization and globalization has changed the dietary pattern of Myanmar residents from traditional diets such as fruits and vegetables with high fiber and low fat to unhealthy diets containing high levels of saturated fats, trans-fats, high amount of sugars and salt. Foods that are high in fats and sugars promote obesity, a major risk factor for CVDs, diabetes and cancers [38]. Adequate consumption of fruits and vegetables may reduce the burden of NCDs such as CVDs, colorectal cancer and gastric cancer [38,39].

It has been estimated that 2.7 million lives could be saved globally each year if fruits and vegetables consumption were increased [40]. Globally, 26.7 million DALYs are attributable to inadequate consumption of fruits and vegetables [41]. In South-East-Asia region, half a million deaths were related to low consumption of fruits and vegetables [25].

Myanmar is an agricultural country, and fresh fruits and vegetables are available throughout the season at low costs. A study in 2009 reported that the mean number of servings of fruits and vegetables on average per day was 2.6, and about 90% of Myanmar population consumed less than the WHO recommended five servings of fruits and vegetables on average per day [24].

1.5.4 Physical Inactivity

Physical inactivity is estimated to cause approximately 3.2 million deaths globally each year[10]. Individuals with inadequate physical activity had 20-30 % higher risk of various kinds of NCDs than those performing moderate physical activity [42]. Approximately 21-25% of breast and colon cancer burden, 27% of diabetes and about 30% of ischemic heart disease burden are attributable to low physical activity [25]. Recent study showed that elimination of physical inactivity could prevent 6-10% of major NCDs and increased life expectancy [43].

Physical inactivity is estimated to cause 5.1% of deaths in South-East-Asia region[25]. In Myanmar, 10% of males and 14% of females did not meet the minimum recommendation for physical activity(<600 Metabolic Equivalent of task (MET)-minutes) [24,44]. Mean duration of time spent on physical activity was 182 minutes per day in 2009 [24].

1.5.5 High Blood Pressure

High blood pressure, a major risk factor for NCDs, is estimated to cause 13 % of global deaths[25]. About half of total deaths from stroke and ischemic health diseases are attributable to hypertension worldwide [25]. High blood pressure was the leading attributable burden of diseases, both globally and in South-East Asia Region, and has increased with 27% from 1990 to 2010 [16].

The prevalence of hypertension is higher in low income countries than in middle and high income countries [10], and is widespread in the South-East Asia region [13]. Hypertension contributed to 1.5 million deaths worldwide and more than one third of the South-East Asian

population were hypertensive [10]. Moreover, the risk of dying from hypertension is more than double in low and middle countries compared to high income countries [25]. The prevalence of hypertension in Myanmar was reported to be 34 % in 2003/04 in Yangon region [23] and 30% in a nationwide study from 2009 [24]. Low level of hypertension control has been reported [24,45].

1.5.6 Overweight and Obesity

Globally overweight and obesity is estimated to cause 2.8 million deaths every year [10]. Adverse metabolic effect of overweight and obesity impact on the blood pressure, serum cholesterol, triglyceride and insulin resistance leading to increased risk of CVD, ischemic heart disease and diabetes mellitus [25]. Increased body mass index (BMI) is also associated with various types of cancers such as breast, colon, kidney [25].

Annually, 35,000 deaths were due to overweight and obesity in South-East Asia region, and overweight prevalence ranged from 8% to 30 % among males and 8% to 52% among females[10]. Waist circumference is an approximate index of intra-abdominal fat mass and which is a risk of NCDs [38]. Previous studies in Myanmar from 2003 and 2009 showed that the prevalence of obesity (BMI $\geq 30 Kg/m^2$) was 0.25% and 4.3% in males, and 0.8% and 8.4% in females respectively [23,24].

1.5.7 Blood Glucose and Diabetes Mellitus

Diabetes Mellitus (DM) is a chronic condition that occurs either when pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces [46].

It was estimated that 347 million people in the world had diabetes mellitus in 2008 [47]. WHO predicted that DM prevalence has steadily increased globally, and that diabetes caused 1.3 million deaths in 2008 [10]. Furthermore, more than 80% of diabetes deaths occur in the low and middle income countries [48]. DM increases the risk of cardiovascular diseases, stroke, renal failure, neuropathy and retinopathy[10,49,50]. The prevalence of DM is increasing in the South-East Asia region, predominantly among urban residents [13].

The prevalence of DM in Myanmar was about 2.5 % in 1995 and in 2000; and expected to increase to 3.2 % by the year 2015 [13]. A report from the 2003/04 STEP survey in Yangon region showed that the overall prevalence of DM was 12 % based on the standard oral glucose tolerance test (OGTT), and 13% for combined impaired fasting glycaemia (IFG) and impaired

glucose tolerance (IGT) [23]. The prevalence of DM in urban area (14 %) was double to that in rural area (7%) of Yangon region [23].

1.5.8 Blood Lipids

High blood cholesterol is one of the world major risk factors for cardiovascular diseases [51]. WHO estimated that high blood cholesterol caused 2.6 million deaths (4.5% of total) worldwide and 29.7 million DALYs in 2004 [10,25].

High blood cholesterol increased the risk of cardiovascular diseases [51], and is responsible for a third of all ischemic heart disease worldwide [25]. Studies from the South-East Asia region showed an increasing trend of blood cholesterol level[52]. It has been estimated that high cholesterol in the South-East Asia region causes 800,000 deaths every year [13]. Diets high in saturated fat and low physical activity can cause high blood cholesterol[25]. It was estimated that reducing 10% of blood cholesterol by the age of 40 can lower 50% risk of ischemic heart disease at the age of 40, and 20% at the age of 70 [53].

Studies have showed that low levels of high density lipoprotein (HDL) was related to the development of the coronary heart disease (CHD) [54], high triglycerides (TG) was also independently associated with the development of the coronary heart disease [55]. In 2008, the prevalence of high total cholesterol was 39% globally and 29% in the South-East Asian region[10]. The 2003/04 study in Yangon region detected 26.2% of high total cholesterol prevalence [23], and the prevalence of high total cholesterol and triglycerides were reported 38.6% and 24.9% from a recent study of 4 townships in Myanmar in 2010 [56].

1.6 Cardiovascular Diseases

Cardiovascular disease (CVDs), the greatest public health epidemic, is the number one killer in the modern world. The major CVDs include CHD, cerebrovascular disease, rheumatic heart disease and hypertension. Abnormal lipid profiles, hypertension, obesity, smoking, physical inactivity, harmful use of alcohol and unhealthy diets contribute to the development of the cardiovascular diseases [10,57]. In 2008, CVDs caused 48% of global NCD deaths accounting for 17 million deaths [13]. About 80% of CVDs deaths occurred in the low- and middle-income countries [13]. A previous study of CVDs in Yangon region reported that the prevalence of CHD, hypertension and rheumatic heart disease were 13.3%, 42.7% and 5.9% in urban areas and 8.5%, 57.9% and 19.1% in rural areas [58].

1.7 Rationale

The NCDs burden can be reduced by controlling common modifiable risk factors. In Myanmar, the prevention and control of NCDs has been set up as the second priority [59], and the government aims to meet the UN commitment to NCDs [17]. In this regard, the estimation of the burden of NCDs and their risk factors is essential in order to effectively implement public health policies.

In 2003-2004 a WHO STEPs survey was undertaken in Yangon Division, and in 2009 a nationwide WHO STEPs survey. These studies provided information on risk behaviors such as tobacco use, alcohol consumption, and physical risk factors such as obesity and hypertension. Biochemical measurement such as blood glucose and lipids were also investigated in 2003-2004, but not in 2009 [23,24]. Thus, more studies on risk factors including biochemical measures are needed, to follow the development, and provide a baseline for preventive strategies. Due to increasing levels of blood cholesterol in South-East Asia region and scarce knowledge about abnormal lipid profiles in Myanmar, the associated factors of high lipid levels and other NCDs risk factors should be investigated.

In order to improve the knowledge about NCD risk factors in Myanmar to help the planning of health policies, the present cross-sectional study was conducted.

1.8 Study Aim and Objectives

1.8.1 Aim

To estimate the prevalence of selected modifiable risk factors of non-communicable diseases and to investigate the association between hypercholesterolemia with selected socio-demographic factors and selected NCD risk factors among 25-74 year old citizens of urban area of Yangon Region, Myanmar.

1.8.2 Objectives

In 25-74 year old urban citizens of Yangon Region, Myanmar;

(1) To estimate the prevalence, by gender and age groups, of the selected modifiable risk factors of non-communicable diseases such as smoking, alcohol consumption, physical inactivity, fruits and vegetables consumption, hypertension, overweight, obesity, high blood glucose and high blood cholesterol;

(2) To investigate the association between hypercholesterolemia with selected socio demographics factors and selected NCD risk factors.

CHAPTER II

POPULATION AND METHODS

2. Population and Methods

2.1 Study design

A household-based cross-sectional study design was conducted with multi-stage cluster sampling. The methodology was in accordance with the WHO STEPs wise approach for the surveillance of major NCD risk factors (WHO, 2008) [60]. All 3 STEPs were carried out.

STEP (1) Questionnaire survey was based on socio-demographic characteristics, smoking, alcohol consumption, physical inactivity, fruits and vegetables consumption, history of hypertension and diabetes.

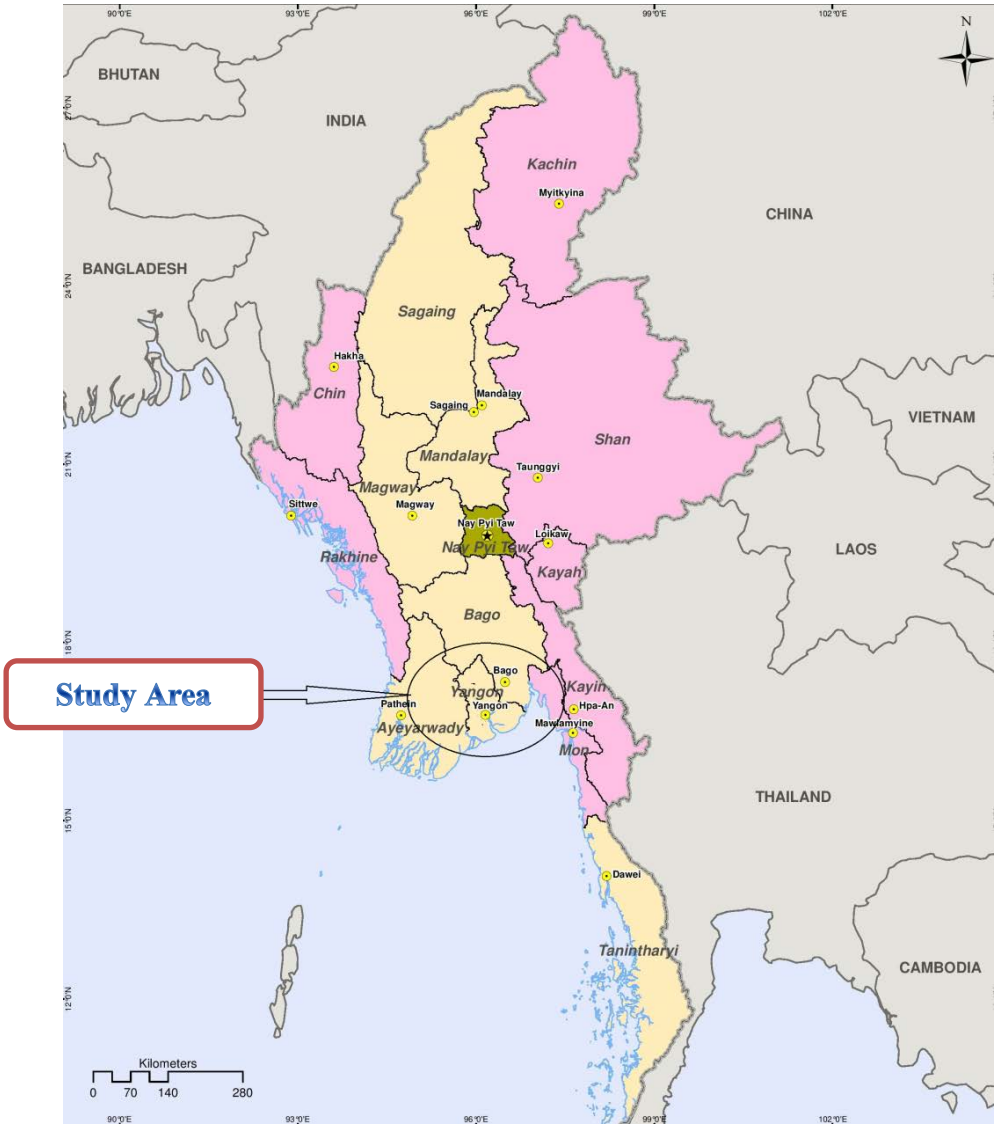
STEP (2) Physical measurement included blood pressure, body height, weight, waist and hip circumference.

STEP (3) Laboratory investigation was undertaken for fasting lipid profiles (total cholesterol (TC), triglycerides(TG), high-density lipoprotein (HDL)) and fasting blood glucose from the venous blood sample.

2.2 Study Area

The research took place in 6 urban townships of Yangon Region, Myanmar from 2nd September to 15th November 2013.Yangon region is located in the Lower part of Myanmar and its total population is estimated to be 5.7 million accounting for 10% of the entire nation[61]. The urban area of Yangon region is the smallest and the most developed region in Myanmar, and also the most densely populated area in Myanmar [3].

Figure 1: Map of the Republic of the Union of Myanmar



Source of Map: From Myanmar Information Management Unit (MIMU) 2013 [62]

2.3 Sampling method and study population

Yangon region is made up of 45 townships (27 urban and 18 rural). Six urban townships were randomly selected. From each of the selected townships, five wards (ward is a part of a townships) were randomly selected (i.e. a total of 30 wards) (Available in the Appendix 1). From each ward, 26-27 households were randomly selected. One person from each household fulfilling the inclusion criteria was invited to participate. The participants answered a structured interview on socio-demographics and risk factors; anthropometric measurement and simple clinical examination were obtained. The next morning, they met for blood drawing in a nearby health facility or survey site.

Inclusion criteria

25-74 year old citizens (both male and female) in urban area of Yangon Region had the equal chance of being invited.

Exclusion criteria

The exclusion criteria referred to mentally ill or mentally retarded patients, and people physically too ill to participate. The institutionalized people, Buddhist monks and nuns were also excluded from the study.

2.3.1 Sample size

For the calculation of the required sample size, WHO sample size calculator for STEP survey was used [60,63]. http://www.who.int/chp/steps/resources/sampling/en/.

Step (1) Initial calculation

$N = z^2 P (1-P)/e^2$

Where N = sample size, z = statistics for α error

P = estimated prevalence of major NCD risk factors

e = margin of error

Step (2) multiply by the design effect and number of ag-sex estimate

n = N * Design effect* number of age-sex estimate

Step (3) Adjust for expected non-response for final sample size

Final sample size= n*non-response rate

Assumption: If we set the alpha error at 5%, z would be 1.96.

Based on previous NCD studies in 2009, the prevalence of risk factors ranged between 1-51.4% [24].

A value of 50% was found to be the most conservative (i.e. yielding the highest sample size).

For example Current smokeless tobacco user in males: 51.4%; obesity in males: 4.3% (according to 2009 national STEP survey)

Based on the formula above with a response rate of 80% and design effect of 1, we required a sample size ranging from:

Smokeless tobacco in male: 767 participants (i.e. 959 invited)

Obesity in male: 126 participants (i.e. 158 invited)

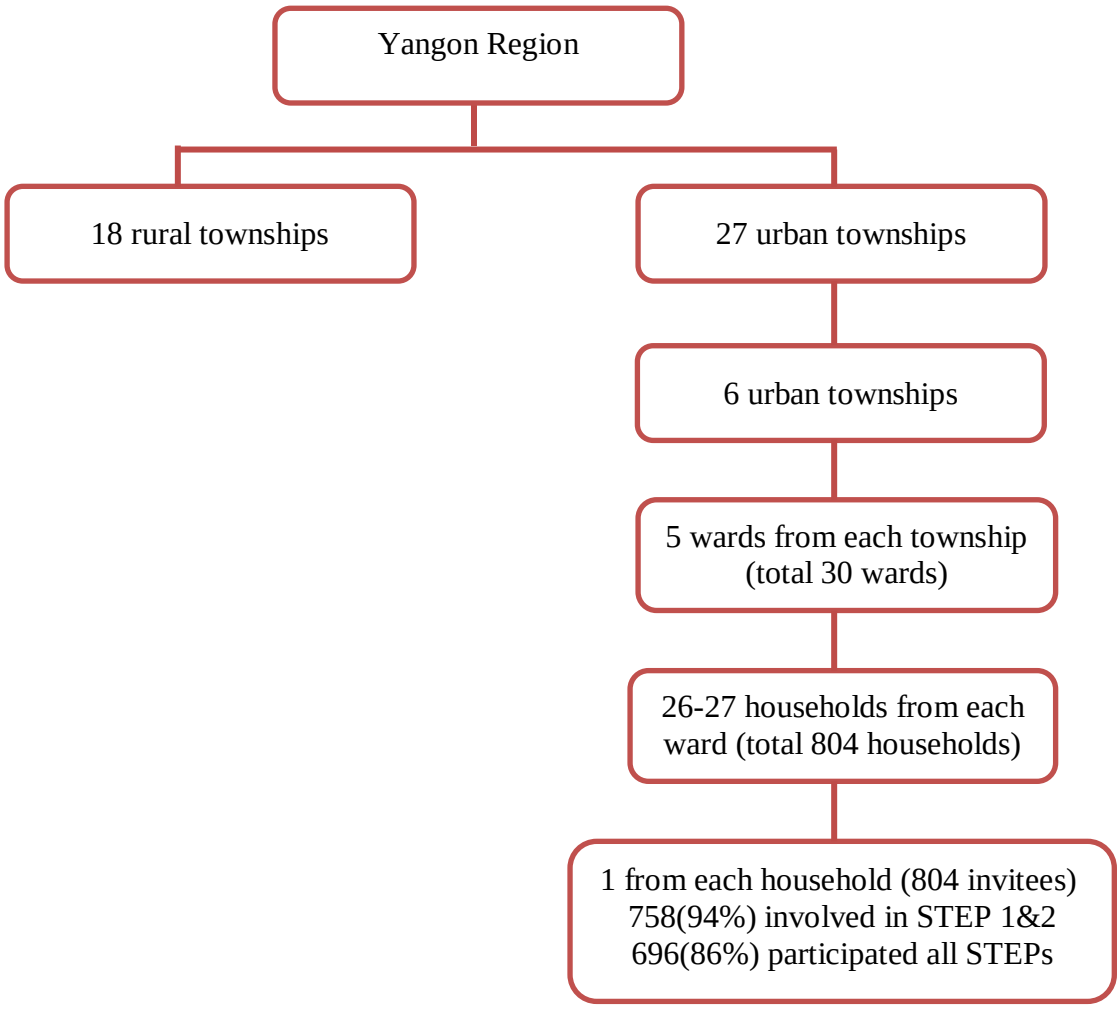
Taking the cluster sampling design into consideration, the sample size was as follows (design effect set at 1.5 according to recommendations from STEPS instruments [60].

Smokeless tobacco in male: 1151 participants (i.e. 1439 invited)

Obesity in male: 189 participants (i.e. 237 invited)

Most risk factors are less than 50%. Assuming that we decided to include 800 subjects that would give us fairly precise estimates for most of the risk factors.

Figure 2 Sampling Process: Urban Yangon



2.3.2 Practical procedures of sampling

2.3.2.1 Inviting people

Personal invitation letter were sent to each household to attend the survey with the assistance of the street-leaders and the local authority. The invitation letter included the purpose of the study, date for testing and place. Information on physical measurement, venous blood investigation for fasting blood glucose and lipid profiles were included in the invitation and information letters. The letters were sent in Myanmar (Burmese) language. (Available in Appendix 2)

2.3.2.2 Sampling procedures

A multistage cluster sampling method was employed.

First Stage: 6 urban townships were selected from 27 urban townships

Firstly, a total of 6 townships were selected from 27 urban townships of Yangon region. We decided to invite 134 participants from each township with equal sex distribution.

Second Stage: 30 wards were selected from 6 selected urban townships

From each township, the list of wards was obtained and 5 wards were taken randomly. Advocacy meetings with local health authority and head of the ward and street-leaders were set - to describe details of the study and to strengthen cooperation.

Third Stage: 26-27 household were selected from 30 selected wards

In the third stage, sampling was conducted in the office of selected wards. Based on the data/map, a choice of 4 streets or blocks was taken using table of random numbers. Two streets/blocks were randomly selected for males and two streets/blocks for females. The next step was to select 6-7 households from each street/block through house number or compound number by using random multiple table. Altogether 26-27 households were randomly taken from the list of households for each selected ward.

In some cases, there were two or more households in the same number, or new buildings with many flats, and different households shared the same roof. In such cases, a random selection was performed among household members. We excluded public buildings, hotels, big shops, religious buildings and schools during the selection process.

Final Stage: one selected person from each household

In the final stage, one eligible subject was randomly selected from the members of each selected household. When a household contained more than one eligible subject, a random selection was carried out among eligible household members. If no eligible participant was found in the chosen household, the selection was moved on to the next adjacent (particularly on the right). When the selected person refused, she/he was regarded as a non-respondent.

Finally, we invited 804 participants (30 wards x 26-27Households) from urban areas (wards) with equal sex distribution (402 each). However, the final sample size included 758 (94%) for STEP (1) and (2). 696 (86%) participants completed all STEPs.

A total of 46 invitees were absent from 6 townships. Among them 39 refused to participate and 7 did not come to the meeting point. Out of 758 participants, 62 participants did not come for the blood investigation. 3 pregnant women were included as participants; however, they were excluded from the analysis.
No detailed interview or survey for the reason of refusal was conducted.

2.4 Training of research assistants

Four research assistants were recruited through the Myanmar Medical Association. A two-days training and pre-test were conducted in the Myanmar Medical Association with the technical inputs from the Department of Medial Research (Lower Myanmar). The trainees were exposed to the methods of sampling, interpersonal communication, obtaining informed consent and a survey questionnaire on the first day. The second day of training was focused on interactive sessions to introduce data collection methods and correct measuring methods for all STEPs. Anthropometric measure, physiological measurement and laboratory tests were practiced and trained according to the standardized method of WHO guideline.

Standardization of the instruments used in the field works were done before and during the training. The trained field researchers conducted a pretest comprising STEP 1 and STEP 2 of survey in Yangon region. Questionnaires were clarified further after the pretest. The trained field researchers underwent trial in practical skill after the clarification.

2.5 Data collection

Each day a total number of 26-27 participants were invited. After obtaining the consent from the invitee, face to face interview was conducted at the residence area of the participant. Effective health communication skills were used in asking questions about households and individuals. After the interview, anthropometrics measurement and simple clinical examination were conducted in a private area of the participant's residence. Blood pressure and heart rate were measured followed by height, weight, waist and hip circumference measurement. Each and every participant was provided with appointment date and time (usually the next morning) for blood examination and was explained about the overnight fasting 10 hours before coming to the assembly site (mostly nearby administrative office or clinic or religious building). The participants also received a reminder phone call for overnight fasting by the fieldworkers in the evening. If the participants had not fasted, a new

appointment was set for another date and time. The field workers arranged home visits for blood testing for those having difficulty in attending the survey site.

2.5.1 Questionnaire

The questionnaire was adopted from the WHO STEPS Instrument version 2.1 and previously translated into Myanmar (Burmese) Language. Some of the questionnaires have been modified to adjust to the local context, for instance, regarding to marital status – the term 'partner' is socially sensitive. Interviews were conducted using questionnaires among 758 respondents.

The questionnaires included socioeconomic status of the participants, the status of tobacco use, alcohol consumption, fruit and vegetable consumption, physical activity, history of hypertension and diabetes. (Available in Appendix 3)

2.5.2 Anthropometrics measurements and simple clinical examination

The anthropometrics measurement included body weight, height, waist and hip circumference.

Since portable stadiometer was not available in Myanmar at the time of data collection, measuring tape was used to measure individual's body height without foot wear and any head gear, taking in centimeter to the exact point of height (the nearest to 0.1 cm). Body weight was measured with a portable electronic weighing scale and noted in kilogram. The participants were requested to wear light clothes without footwear during weighing.

Waist and hip circumference measurement were conducted in a private place with the measuring tape. Waist circumference was taken at midpoint between the lower margin of the last palpable rib and the top of the iliac crest (hip bone), in the standing position without clothing and directly over the skin, according to the WHO guideline [60]. Exact point in centimeter was recorded. The hip circumference was taken in centimeter at maximum circumference over buttocks horizontally.

Blood pressure was measured three times, 15 minutes after interviewing by using OMRON M6, automatic blood pressure monitor. WHO recommended OMRON M6 was validated [64] and passed validation protocol [65]. Following the WHO guideline, blood pressure was taken from the left arm, keeping the cuff at the same level as the heart during procedure with elbow

support. To attain correct measurement, no talk during procedure, emptying bladder, no coffee before and during the measurement were strictly followed. The universal cuff was used; however, appropriated cuffs were used when needed. The participants were allowed to rest for 3 minutes between each reading. The average of second and third readings of both systolic and diastolic pressure was calculated for feedbacks to participants and data analysis.

2.5.3 Blood investigation

Laboratory investigation included fasting blood glucose, total cholesterol, triglyceride and HDL.

The participants were invited to the nearby health center or survey site in the morning for blood sample collection**.** Four milliliter of overnight fasting venous blood sample was drawn to measure serum total cholesterol, triglyceride, HDL and fasting plasma glucose. All of the participants were provided with breakfast (coffee/tea and snack) after blood sample collection.

Blood samples were collected in the collection lipid tube and glucose tube containing fluoride separately in the cold boxes and transported to the National Health Laboratory, Yangon, a WHO reference laboratory in Myanmar, immediately for analysis. The results were reported the day after the test.

Blood glucose concentration was measured by enzymatic reference method with hexokinase, using reagents of COBAS from Roche Diagnostics, Indianapolis, IN. Serum concentration of total cholesterol, triglycerides and HDL were determined by using enzymatic colorimetric test with reagents of COBAS from Roche Diagnostics, Indianapolis, IN.
LDL concentration was calculated from Friedewald (1972) equation.

$$LDL = TC – HDL – TG/ 2.17 \text{ (mmol/L)}$$

One male and one female participant refused to continue drawing blood during procedure, and we stopped immediately. In these cases, available amount of blood was used for fasting blood glucose.

2.6 Data Handling

All the electronic and paper copies of the questionnaires were stored in the safe place of the principal investigator. Data was entered in the Epidata version 3.1, and transferred to SPSS for data cleaning and analysis. After data entry, the main copy was transferred to the memory stick to save from an unexpected damage. All information was handled with high confidentiality.

2.7 Data management and analysis

After each interview, the research assistant checked for completeness and consistency of the questionnaires. Data were coded by the principal investigator, double entered in Epidata software version 3.1. Data from Epidata 3.1 was transferred to the statistical package for Social scientists (SPSS) version 20 in order to clean and analyze.

SPSS version 20 and Epi info 7 were used to calculate the descriptive and analytical statistics, in accordance with the WHO STEPS guidelines. Means, 95% confident interval (CI) and/or standard deviation (SD) were included in the descriptive analysis. Prevalence of NCDs risk factors were calculated in percentages with 95% confident interval. Age-standardized prevalence was calculated for the major risk factors by the direct standardization method with the WHO world standard population[19].

In the logistic regression analysis, some variables were recoded. Hypercholesterolemia was evaluated, and odds ratios (OR) with 95% confidence intervals (CI) and P-value were calculated using univariate and multivariate binary regression model.

2.8 Ethics

Approval for the present study was obtained from the Ministry of Health, Ethical committee from the Norwegian Regional Committees for Medical and Health Research Ethics (REK) and also from Department of Health, Myanmar. (Available in Appendix 4) The Regional Health Department of Yangon also granted the permission and provided supporting documents to the research team to conduct the present study properly.

At the community level, the principal investigator contacted with both the township medical officers and the township administrators of each township to introduce the research project,

the purpose, the methods and content of investigation. The research team also obtained permission from the township health departments and local authorities. Verbal and written consents (available in Appendix 5) were obtained from each participant after explaining the purpose, method and procedures of the study. Awareness for their right to withdrawal from the study at any time without reprisal was ensured to every individual. The interview was done at the places where privacy was ensured.

Utmost care was provided to avoid injury and infection to the participants during the venous blood drawing. The disposable sterile syringes and needles instruments were utilized and disinfection was carried out with strictness. If a participant suffered from injury or infection that was directly caused by blood drawing or participating in the study, the investigator would arrange for treatment and care in clinic or hospital by personal obligation. No injury was reported during blood investigation throughout the survey. All information of subject's physical and mental integrity on the personality was handled with strict confidentially.

2.9 Funding

The research funding was provided by the NORHED Project of "Health and Sustainable Development in Myanmar (MY-NORTH)".

2.10 Feedback to the respondents

Confidentiality of the test results was maintained and all the respondents were provided with the overview results from the physical examination and blood investigation. (The feedback form is available at Appendix 6)

2.11 Variables

Age and Education

Age was defined as the completed year of age. Education was divided into seven categories; no formal school, less than primary school, primary school completed, secondary school completed, high school completed, college/university and post-graduate degree, and also the total years of education. In the regression analysis, education was regrouped into three groups from seven former groups, such as primary level, secondary level and high level education. Primary level was defined as education level that was below the primary school completed. Secondary level was regrouped as the education level that completed secondary or high school education. High education was defined as university or post-graduate education.

Ethnic group

Ethnic groups were divided into 8 major ethnic groups of Myanmar, namely Kachin, Kayar, Kayin, Chin, Mon, Burma, Rakhine and Shan. The rest were categorised as "Others".

Marital status

In marital status, the term "partner or cohabiting" was removed from the categories since it was not socially acceptable and no such customs were practiced in Myanmar.

Employment

Employment status were classified into 9 categories; government employee, non-government employee, self-employed, non-paid, student, homemaker, retired, unemployed (able to work) and unemployed (unable to work). In the regression analysis, the employment status was regrouped into three groups; employed, unpaid and retired and unemployed. Employed group included the people who had paid-jobs. Volunteer, student and homemakers were in the unpaid groups. Retired and unemployed people made the last group.

Income

To identify status of the income, monthly household income was asked. The daily income was calculated and converted into USD (United State dollar) from Kyats (Myanmar currency).

Tobacco use

Tobacco consumption was assessed with several questions and show cards were used.

Current smoker was defined as those currently smoked daily or less than daily. Current smokeless tobacco user was defined as those who currently used any smokeless tobacco such as snuff, chewing tobacco and betel quid. Current tobacco user was defined as those currently smoked and/or used smokeless tobacco daily or less than daily.

Alcohol consumption

Alcohol consumption was assessed with the standard drinking. According to the WHO guideline, one standard drink was defined as any drink containing approximately net 10 grams of pure alcohol [60]. During data collection on alcohol consumption, show cards and tables were used to get an approximate amount of consumption.

Current drinker was those who consumed alcohol in the previous 30 days. Binge drinking was defined as consuming on one occasion 5 or more standard drinks for males and 4 or more standard drinks for females [60,66].

Fruits and vegetables consumption

Frequency of fruits and vegetable consumption was asked in order to assess the dietary pattern of the participant. Show cards were used to guide and identify the amount of serving during data collection. One standard serving was equivalent to approximately 80 grams [60]. One serving of vegetable was defined as one plate (quarter-plate) of raw green leafy vegetables, or half cup (quarter-bowl) of cooked or chopped vegetables, or half-cup (quarter-bowl) of vegetable juice or soup. One serving of fruit was defined as one medium sized piece of fruit, for instance mango, apple or banana, or half cup (quarter-bowl) of cooked or chopped fruits, or half-cup (quarter-bowl) of fruits juice or soup.

Physical activity

Physical activities were categorized into 3 groups as high level physical activity, moderate level physical activity and low level physical activity by using standard metabolic equivalent of tasks (MET) based on WHO guidelines. One MET unit is defined as energy utilized by the body's metabolism while sitting quietly in position, which is equal to 1 kcal/kg/hour [60]. Total Physical activities were calculated with domain of MET units. MET value for vigorous activities of work and recreation is 8.0, for moderate activities of work, recreation like walking and jogging and transport is 4.0 [60].

High Physical activity: those who had at least 3 days of vigorous activity with minimum of 1500 MET minutes per week OR who had 7 or more days of moderate activity with minimum 3000 MET- minutes per week.

Moderate Physical activity:

A person who did not meet above mentioned criteria, but he/she were entitled the following criteria were classified as moderate physical activity.

Those who had 3 or more days of vigorous-intensity activity of at least 20 minutes per day or who had 5 or more days of moderate-intensity activity at least 30 minutes per day OR

5 or more days of any combination of walking, moderate- or vigorous intensity activities having a minimum of at least 600 MET-minutes per week [67].

Low Physical activity: Those who did not meet the criteria for above mentioned groups were contained in the low physical activity group [60].

Hypertension

Hypertension was defined as an average of systolic blood pressure (SBP) ≥140 mmHg and/ or diastolic blood pressure (DBP) ≥ 90 mmHg, and/or self-reported current anti-hypertensive treatment for hypertension within 2 weeks prior to the interview [60].

Current use of anti-hypertensive drugs was recorded, as well as awareness of hypertension.

Awareness of hypertension was defined as self-reported of a prior diagnosis by medical doctor or health workers. Treatment of hypertension was defined as the use of anti-hypertensive drugs for hypertension prescribed by the medical doctors or health workers.

Control of hypertension was regarded as SBP <140 and/or DBP <90 mmHg among those currently on treatment with a previous history of Hypertension.

Anthropometry

Body Mass index (BMI) was computed as weight in kilograms divided by height in meters squared (kg/m^2).

BMI= Body weight (kg): Body height (m) ^{2}

WHO defines underweight as ≤ 18.4 kg/m^2, normal weight as 18.5-24.9 kg/m^2, overweight as 25-29.9 kg/m^2 and obesity as ≥ 30 kg/m [246].

Several studies showed that Asian people had the higher percentage of body fat than in white people of the same age, sex and BMI, therefore, the WHO expert consultation suggested that the WHO BMI cut off was not suitable for the Asian population [68]. They identified the potential BMI cut off (overweight=23-27.5 kg/m^2.Obese ≥27.5 kg/m^2) for different Asian population, [68] although, some studies debated on that cut-points for Asian [69-72].

In the present study, BMI was also classified according to the WHO BMI cut off for Asian – Underweight <18.5 kg/m^2 , normal weight as 18.5-22.9 kg/m^2, overweight as 23-27.5 kg/m^2 and obesity as ≥ 27.5 kg/m [268].

The central obesity for Asian was defined as men with waist circumference (WC) ≥ 90 cm, and the women with (WC) ≥ 80 cm according to the WHO guideline [73]. Waist-to-hip ratio (WHR) was defined as the ratio of the circumference of the waist to that of the hips [74].

High blood glucose/ Diabetes

Diabetes Mellitus (DM) was defined as a fasting blood glucose level of 7 ≥ mmol/L [75].

Awareness of DM was defined as a prior diagnosis by a medical doctor or health workers.

Treatment of DM was defined as on the medication for Diabetes Mellitus prescribed by a medical doctors or health workers.

Control of DM was regarded as a fasting blood glucose level of < 7mmol/L among those currently on treatment with a previous history of DM.

Lipid profiles

Laboratory results for lipid profiles were assessed based on the WHO category in Table (1).

Table 1. Lipid profiles indicators (WHO) [60]

Lipid profiles	Normal	Moderate	High
Total Cholesterol	<5.0 mmol/L	5.0-6.1 mmol/L	≥6.2 mmol/L
Triglycerides	<2.0 mmol/L		≥2.0 mmol/L
HDL	Low: Male:<1.03 mmol/L, Female: <1.29)mmol/L		

Hypercholesterolemia was also determined as more than 5.17 mmol/L of total cholesterol level according to the abnormal lipid profile criteria in the report of National Cholesterol Education Programme (NCEP) [19]. LDL was defined as normal <4.13 mmol/L, at risk 4.13-4.9 mmol/L and increased >4.91 mmol/L based on NCEP report [19].

2.12 The Framingham coronary heart disease (CHD) prediction

The Framingham risk score is to estimate the 10 year risk of developing coronary heart disease [57]. It is an gender-specific algorithm and based on the age, total cholesterol, HDL, systolic blood pressure and diastolic blood pressure, diabetes mellitus and smoking[57]. The low risk is less than 10% chance, intermediate risk is 10-20% chance and high risk is more than 20 % chance of developing coronary heart diseases [76]. The prediction of the coronary heart disease was computed with moderate and high 10 years risk (i.e more than 10 % of chance).

CHAPTER III

RESULTS

3. RESULTS

3.1 Socio-demographic characteristics

The Socio-demographic characteristics of the study population are described in Table (2). The mean age of the participants was 48.7 years with standard deviation 13.2 (Male 49.8±13.8 and Female 47.5±12.4).

The mean years of education was 10.8 ± 3.8 (male 10.8 ±3.8 and female 9.7±4.3).
More women than men attained less education than Primary school. Most of the female were homemakers, i.e housework (50 %), while most male were self-employed (45%). 9% of the participants did not have occupation although they were able to work. The unemployment rate was 10 % with no pattern in genders.

79% of male and 70 % of female were married and less than 1 % was divorced.
More than 40% of the population lived under the poverty line (less than 2USD/day), and 11% of males and 15 % of females, respectively, lived in extreme poverty (less than 1 USD/day). Only 15 % earned more than 5 USD/day.

Table 2. Socio-demographics characteristics among 25-74 year urban citizens of Yangon Region, Myanmar

	Male (n=376)		Female (n=379)		Total (n=755)	
	Number	%	Number	%	Number	%
Age(Years) Mean ± SD	49.8±13.8		47.5±12.4		48.7±13.2	
Age(Years)						
25-34	75	19.9	67	17.7	142	18.8
35-44	61	16.2	99	26.1	160	21.2
45-54	79	21.0	92	24.3	171	22.6
55-64	96	25.5	82	21.6	178	23.6
65-74	65	17.3	39	10.3	104	13.8
Education (Years) Mean ± SD	10.8±3.8		9.7±4.3		10.2±4.1	
Highest Education						
No formal school	7	1.9	13	3.4	20	2.6
Less than Primary school	10	2.7	25	6.6	35	4.6
Primary school completed	74	19.7	93	24.5	167	22.1
Secondary school completed	98	26.1	78	20.6	176	23.3
High school completed	87	23.1	70	18.5	157	20.8
College/University completed	93	24.7	92	24.3	185	24.5
Post graduate degree	7	1.9	8	2.1	15	2.0
Occupation						
Government employee	27	7.2	13	3.4	40	5.3
Non-government employee	53	14.1	15	4.0	68	9.0
self-employed	170	45.2	104	27.4	274	36.3
Non-paid	14	3.7	2	0.5	16	2.1
Student	1	0.3	0	0	1	0.1
Homemaker	0	0	192	50.3	190	25.2
Retired	71	18.9	17	4.5	88	11.7
Unemployed (able to work)	34	9.0	32	8.4	66	8.7
Unemployed (unable to work)	6	1.6	6	1.6	12	1.6
Marital status						
Never married	60	16.0	56	14.8	116	15.4
Currently married	295	78.5	266	70.2	561	74.3
Separated	2	0.5	5	1.3	7	0.9
Divorced	1	0.3	5	1.3	6	0.8
Widowed	18	4.8	47	12.4	65	8.6
Income Status (MMK*)						
Less than 1 USD per day	40	10.6	56	14.8	96	12.7
1-2 USD per day	112	29.8	111	29.3	223	29.5
>2 - 5 USD USD per day	136	36.2	123	32.5	259	34.3
more than 5 USD per day	57	15.2	53	14.0	110	14.6
Refused to answer	31	8.2	36	9.5	67	8.9

*MMK : Myanmar Kyats (1 USD=953.8 MMK as of 05-11-2013)

3.2 Tobacco use

The prevalence of smoking was more than 10 times higher in males (43%) than in females (4%). (Table 3) Among younger males, the prevalence of smoking was the highest (57%), and among females the prevalence was highest in the older age groups (3-9%).

Table 3. Current smokers by age and genders among 25-74 years old citizens of urban Yangon

*Current smokers									
Age group (Years)	Male			Female			Both Genders		
	N	%	95% CI	N	%	95% CI	N	%	95% CI
25-34	75	57.3	(45.4-68.7)	67	0.0	-	142	30.3	(22.9-38.6)
35-44	61	45.9	(33.1-59.2)	99	3.0	(0.6-8.6)	160	19.4	(13.6-26.4)
45-54	79	57.0	(45.3-68.1)	92	3.3	(0.7-9.2)	171	28.1	(21.5-35.4)
55-64	96	36.5	(26.8-46.9)	82	8.5	(3.5-16.8)	178	23.6	(17.6-30.5)
65-74	65	18.5	(9.9-30.0)	39	2.6	(0.1-13.5)	104	12.5	(6.8-20.4)
Total	376	43.4	(38.3-48.5)	379	3.7	(2.1-6.3)	755	23.4	(20.5-26.7)

*Current smoker was defined as those currently smoked daily or less than daily.

Table (4) presents the status of smokeless tobacco use. The prevalence of smokeless tobacco was 40 % among males and 16% among females, giving a total of 28 %. In the male population, the prevalence of smokeless tobacco consumption was highest among younger age groups, with the same pattern was observed among females.

Table 4. Current smokeless tobacco users by age and genders among 25-74 years old citizens of urban Yangon

*Current Smokeless Tobacco Users									
Age Group (Years)	Male			Female			Both Genders		
	N	%	95% CI	N	%	95% CI	N	%	95% CI
25-34	75	54.7	(42.8-66.2)	67	16.4	(8.5-27.5)	142	36.6	(28.7-45.1)
35-44	61	50.8	(37.7-63.8)	99	15.2	(8.7-23.8)	160	28.8	(21.2-36.4)
45-54	79	46.8	(35.5-58.4)	92	19.6	(12.0-29.1)	171	32.2	(25.2-39.7)
55-64	96	30.2	(21.2-40.4)	82	11.0	(5.1-19.8)	178	21.4	(15.6-28.1)
65-74	65	21.5	(12.3-33.5)	39	15.4	(5.9-30.5)	104	19.2	(12.2-28.1)
Total	376	40.4	(35.5-45.6)	379	15.6	(12.1-19.7)	755	27.9	(24.8-31.3)

* Current smokeless tobacco user was defined as those who currently used any smokeless tobacco such as snuff, chewing tobacco and betel quid.

Table (5) shows the prevalence of tobacco use, cigarette smoking or smokeless tobacco, indicating a prevalence of 64% in males and 18% in females. The prevalence was highest in the age groups 25 to 54 in males (75-79%).

Table 5. Current tobacco users (both smoke and smokeless) by age and genders among 25-74 years old citizens of urban Yangon

*Current Tobacco Users									
Age Group (Years)	Male			Female			Both Genders		
	N	%	95% CI	N	%	95% CI	N	%	95% CI
25-34	75	77.3	(66.2-86.2)	67	16.4	(8.5-27.5)	142	48.6	(40.1-57.1)
35-44	61	75.4	(62.7-85.5)	99	17.2	(10.3-26.1)	160	39.4	(39.8-47.4)
45-54	79	78.5	(67.8-86.9)	92	20.7	(12.9-30.4)	171	47.4	(39.7-55.1)
55-64	96	54.2	(43.7-64.4)	82	19.5	(11.6-29.7)	178	38.2	(31.0-45.8)
65-74	65	36.9	(25.3-49.8)	39	15.4	(5.9-30.5)	104	28.8	(20.4-38.6)
Total	376	64.4	(59.3-69.2)	379	18.2	(14.5-22.5)	755	41.2	(37.7-44.8)

***** Current tobacco user was defined as those who currently smoked and/or used smokeless tobacco daily or less than daily.

3.3 Alcohol consumption

The overall prevalence of the current drinkers, binge drinkers and lifetime abstainers were 14%, 6% and 65% (not shown in Tables). Table (6) indicates that the current drinking pattern was higher in the younger age groups. The current drinking pattern was almost 50% in the youngest age group (25-34 years). Alcohol consumption was low among females, 89% was lifetime abstainers and only 1% was current drinkers.

Table 6. Alcohol consumption status of males by age among 25-74 years old citizens of urban Yangon

Alcohol Consumption status among Males									
Age group (Years)	N	Current drinkers (past 30 days)		Drank in past 12 months		Past 12 months abstainer		Lifetime abstainers	
		%	95% CI	%	95% CI	%	95% CI	%	95% CI
25-34	142	49.3	(37.6-61.2)	6.7	(2.2-14.9)	12.0	(5.6-21.6)	32.0	(21.7-43.8)
35-44	160	31.1	(20.0-44.3)	18.0	(9.4-30.0)	23.0	(13.2-35.5)	27.9	(17.2-40.8)
45-54	171	30.4	(20.5-41.8)	13.9	(7.2-23.6)	21.5	(13.1-32.2)	34.2	(23.8-45.7)
55-64	178	16.7	(9.8-25.7)	7.3	(3.0-14.5)	33.3	(24.0-43.7)	42.7	(32.6-53.2)
65-74	104	7.7	(2.5-17.1)	6.2	(1.7-15.0)	21.5	(12.3-33.5)	64.6	(51.8-76.1)
Total	755	26.9	(22.5-31.7)	10.1	(7.3-13.7)	22.9	(18.8-27.5)	40.2	(35.2-45.3)

Table 7. Alcohol consumption status of females by age among 25-74 years old citizens of urban Yangon

Alcohol Consumption status among females									
Age group (Years)	N	Current Drinkers		Drank in past 12 months		Past 12 months abstainer		Lifetime abstainers	
		%	95% CI	%	95% CI	%	95% CI	%	95% CI
25-34	67	1.5	(0.04-8.0)	6.0	(1.7-14.6)	13.4	(6.3-24.0)	79.1	(67.4-88.1)
35-44	99	1.0	(0.03-5.5)	2.0	(0.3-7.1)	9.1	(4.2-16.6)	87.9	(79.8-93.6)
45-54	92	2.2	(0.3-7.6)	2.2	(0.3-7.6)	2.2	(0.3-7.6)	93.5	(86.3-97.6)
55-64	82	0.0	-	1.2	(0.03-6.6)	4.9	(1.3-12.0)	93.9	(86.3-98.0)
65-74	39	2.6	(0.1-13.5)	0	-	7.7	(1.6-20.9)	89.7	(75.8-97.1)
Total	379	1.3	(0.5-3.2)	2.4	(1.2-4.6)	7.1	(4.8-10.3)	89.2	(85.5-92.0)

3.4 Fruits and vegetables consumption

The average number of days consuming fruits in a week was 3.1 days in total (3.0 days in males and 3.2 days in females). The average number of days consuming vegetables per week was 5.4 days (5.3 days among males and 5.5 days among females). The overall mean number of serving fruit and/or vegetables per day was 3.1 days (3.2 days in males and 3.0 days in females) (not shown in Tables). Table (8) shows that 82 % of the respondents consumed less than the recommended five servings of fruits and vegetables on average per day. Consumption of fruits and vegetables was higher among males than females.

Table 8. Less than five servings of fruits and/or vegetables on an average per day by age and genders among 25-74 years old citizens of urban Yangon

Less than five servings of fruits and/or vegetables on an average per day									
Age Group (Years)	Male			Female			Both Genders		
	N	%	95% CI	N	%	95% CI	N	%	95% CI
25-34	75	86.7	(76.8-93.4)	67	86.6	(76.0-93.7)	142	86.6	(79.9-91.8)
35-44	61	78.7	(66.3-88.1)	99	81.8	(72.8-88.9)	160	80.6	(73.6-86.4)
45-54	79	81.0	(70.6-89.0)	92	87.0	(78.3-93.1)	171	84.2	(77.9-89.3)
55-64	96	78.1	(68.5-85.9)	82	81.7	(71.6-89.4)	178	79.8	(73.1-85.4)
65-74	65	75.4	(63.1-85.2)	39	87.2	(72.6-95.7)	104	79.8	(70.8-87.0)
Total	376	80.1	(75.6-83.9)	379	84.4	(80.3-87.9)	755	82.3	(79.3-84.9)

3.5 Physical activity

Table (9-11) presents the level of physical activity. Generally, the majority of the people were engaged in moderate and high level physical activity. The highest percentage of high physical activity was detected in the youngest age-groups and declined with increasing age, 14 % were engaged in low physical activity. More males had low physical activity compared with females.

Table 9. Level of physical activity by age among 25-74 years old citizens of urban Yangon

Level of total physical activity							
Age group Years	N	Low Physical activity*		Moderate Physical activity**		High physical activity***	
		%	95% CI	%	95% CI	%	95% CI
25-34	142	9.9	(5.5-15.0)	16.2	(10.6-23.3)	73.9	(65.9-80.9)
35-44	160	10.6	(6.3-16.5)	20.6	(14.6-27.7)	68.8	(61.0-75.8)
45-54	171	8.8	(5.0-14.1)	18.1	(12.7-24.7)	73.1	(65.8-79.6)
55-64	178	16.3	(11.2-22.6)	27.5	(21.1-34.7)	56.2	(48.6-63.6)
65-74	104	26.0	(17.9-35.5)	37.5	(28.2-47.5)	36.5	(27.3-46.6)
Total	755	13.5	(11.2-16.2)	23.2	(20.3-26.4)	63.3	(59.8-66.7)

*Low physical activity <600MET minutes per week, **Moderate physical activity: vigorous activity >3 days at least 20 minutes, or moderate activity > 5 days at least 30 minutes per day, or > 5 day of any combination who had > 600 MET minutes per week ***High physical activity: at least 3 days of vigorous activity> 1500 MET minutes per week or moderate activity >7 with >3000 MET- minutes per week.

Table 10. Level of physical activity of males by age among 25-74 years old citizens of urban Yangon

Level of total physical activity among Males							
Age group Years	N	Low Physical activity*		Moderate Physical activity**		High physical activity***	
		%	95% CI	%	95% CI	%	95% CI
25-34	75	6.7	(2.2-14.9)	14.7	(7.6-24.7)	78.7	(67.7-87.3)
35-44	61	14.8	(7.0-26.2)	29.5	(18.5-42.6)	55.7	(42.5-68.5)
45-54	79	12.7	(6.3-22.1)	24.1	(15.1-35.0)	63.3	(51.7-73.9)
55-64	96	19.8	(12.4-29.2)	34.4	(25.0-44.8)	45.8	(35.6-56.3)
65-74	65	23.1	(13.5-35.2)	40.0	(28.0-52.9)	36.9	(25.3-49.8)
Total	376	15.4	(12.0-19.6)	28.5	(24.0-33.4)	56.1	(50.9-61.2)

*Low physical activity <600MET minutes per week, **Moderate physical activity: vigorous activity >3 days at least 20 minutes, or moderate activity > 5 days at least 30 minutes per day, or > 5 day of any combination who had > 600 MET minutes per week ***High physical activity: at least 3 days of vigorous activity> 1500 MET minutes per week or moderate activity >7 with >3000 MET- minutes per week.

Table 11. Level of physical activity of females by age among 25-74 years old citizens of urban Yangon

Level of total physical activity among Females							
Age group Years	N	Low Physical activity*		Moderate Physical activity**		High physical activity***	
		%	95% CI	%	95% CI	%	95% CI
25-34	67	13.4	(6.3-24.0)	17.9	(9.6-29.2)	68.7	(56.2-79.4)
35-44	99	8.1	(3.6-15.3)	15.2	(8.7-23.8)	76.8	(67.2-84.7)
45-54	92	5.4	(1.8-12.2)	13.0	(6.9-21.7)	81.5	(72.1-88.9)
55-64	82	12.2	(6.0-21.3)	19.5	(11.6-29.7)	68.3	(57.1-78.1)
65-74	39	30.8	(17.0-47.6)	33.3	(19.1-50.2)	35.9	(21.2-52.8)
Total	379	11.6	(8.7-15.4)	17.9	(14.3-22.3)	70.4	(65.5-74.9)

*Low physical activity <600MET minutes per week, **Moderate physical activity: vigorous activity >3 days at least 20 minutes, or moderate activity > 5 days at least 30 minutes per day, or > 5 day of any combination who had > 600 MET minutes per week ***High physical activity: at least 3 days of vigorous activity> 1500 MET minutes per week or moderate activity >7 with >3000 MET- minutes per week.

3.6 Body mass index (BMI)

BMI classification is shown in the Tables (12-15). Based on the WHO classification, the results revealed that 44 % of the participants were overweight and obesity, 53% and 35% were females and males respectively (Table 12). The highest prevalence of overweight and obesity was observed in the 35-54 years age groups. The prevalence of underweight was more than 2 times higher in males compared to females.

Based on the BMI classification for Asian (Table 15), the prevalence of overweight and obesity was 61 %, the highest prevalence (70%) was observed in 45-54 year age-groups.

Table 12. BMI WHO standard Classification by age among 25-74 years old citizens of urban Yangon

BMI Classification									
Age Group (years)	N	Underweight		Normal		Overweight		Obesity	
		%	95%CI	%	95%CI	%	95%CI	%	95%CI
25-34	142	10.6	(6.0-16.8)	61.3	(52.7-69.3)	21.8	(15.3-29.5)	6.3	(2.9-11.7)
35-44	160	6.3	(3.0-11.2)	44.4	(36.5-52.4)	36.3	(28.8-44.2)	13.1	(8.3-19.4)
45-54	171	3.5	(1.3-7.5)	42.1	(34.6-49.9)	37.4	(30.2-45.1)	17.0	(11.7-23.4)
55-64	178	5.6	(2.7-10.1)	51.7	(44.1-59.2)	29.2	(22.7-36.5)	13.5	(8.8-19.4)
65-74	104	7.7	(3.4-14.6)	50.0	(40.0-60.0)	25.0	(17.0-34.5)	17.3	(10.6-26.0)
Total	755	6.5	(4.9-8.6)	49.5	(45.9-53.2)	30.6	(27.4-3.0)	13.4	(11.1-16.1)

BMI: underweight $\leq$ 18.4 kg/m^2, normal weight =18.5-24.9 kg/m^2, overweight =25-29.9 kg/m^2 and obesity as $\geq$ 30 kg/m^2.

Table 13. BMI WHO standard Classification of males by age among 25-74 years old citizens of urban Yangon

Age Group years	N	Underweight		Normal		Overweight		Obesity	
		%	95%CI	%	95%CI	%	95%CI	%	95%CI
25-34	75	13.3	(6.6-23.2)	64.0	(52.1-74.8)	20.0	(11.7-30.8)	2.7	(0.3-9.3)
35-44	61	11.5	(4.7-22.2)	54.1	(40.9-66.9)	27.9	(17.2-40.8)	6.6	(1.8-16.0)
45-54	79	5.1	(1.4-12.5)	45.6	(34.3-57.2)	41.8	(30.8-53.4)	7.6	(2.8-15.8)
55-64	96	7.3	(3.0-14.5)	60.4	(49.9-70.3)	25.0	(16.7-34.9)	7.3	(3.0-14.5)
65-74	65	10.8	(4.4-20.9)	52.3	(39.5-64.9)	21.5	(12.3-33.5)	15.4	(7.6-26.5)
Total	376	9.3	(6.7-12.8)	55.6	(50.4-60.7)	27.4	(23.0-32.3)	7.7	(5.3-11.0)

BMI: underweight ≤ 18.4 kg/m^2, normal weight =18.5-24.9 kg/m^2, overweight =25-29.9 kg/m^2 and obesity as ≥ 30 kg/m^2.

Table 14. BMI WHO standard Classification of females by age among 25-74 years old citizens of urban Yangon

Age Group years	N	Underweight		Normal		Overweight		Obesity	
		%	95%CI	%	95%CI	%	95%CI	%	95%CI
25-34	67	7.5	(2.5-16.6)	58.2	(45.5-70.2)	23.9	(14.3-35.9)	10.4	(4.3-20.4)
35-44	99	3.0	(0.6-8.6)	38.4	(28.8-48.7)	41.4	(31.6-51.8)	17.2	(10.3-26.1)
45-54	92	2.2	(0.3-7.6)	39.1	(29.1-49.9)	33.7	(24.2-44.3)	25.0	(16.6-35.1)
55-64	82	3.7	(0.8-10.3)	41.5	(30.7-52.9)	34.1	(24.0-45.5)	20.7	(12.6-31.1)
65-74	39	2.6	(0.1-13.5)	46.2	(30.1-62.8)	30.8	(17.0-47.6)	20.5	(9.3-36.5)
Total	379	3.7	(2.1-6.3)	43.5	(38.5-48.7)	33.8	(29.1-38.8)	19.0	(15.3-23.4)

BMI: underweight ≤ 18.4 kg/m^2, normal weight =18.5-24.9 kg/m^2, overweight =25-29.9 kg/m^2 and obesity as ≥ 30 kg/m^2.

Table 15. BMI Classification for Asian by age among 25-74 years old citizens of urban Yangon

Age Group years	N	Underweight		Normal		Overweight		Obesity	
		%	95%CI	%	95%CI	%	95%CI	%	95%CI
25-34	142	10.0	(5.6-16.2)	45.7	(37.3-54.3)	30.0	(22.6-38.3)	14.3	(9.0-21.2)
35-44	160	5.7	(2.7-10.6)	28.7	(21.7-36.4)	40.1	(32.4-48.2)	25.5	(18.9-33.0)
45-54	171	3.6	(1.3-7.6)	26.6	(20.1-34.0)	38.5	(31.1-46.2)	31.4	(24.5-38.9)
55-64	178	5.7	(2.8-10.3)	31.0	(24.3-38.5)	39.1	(31.8-46.8)	24.1	(18.0-31.2)
65-74	104	7.8	(3.5-14.9)	32.4	(23.4-42.3)	36.3	(27.0-46.4)	23.5	(15.7-33.0)
Total	755	6.3	(4.7-8.4)	32.5	(29.1-36.0)	37.1	(33.6-40.7)	24.1	(21.1-27.4)

Underweight <18.5 kg/m^2 , normal weight=18.5-22.9 kg/m^2, overweight=23-27.5 kg/m^2 and obesity ≥ 27.5 kg/m^2

3.7 Waist circumference (WC) and hip circumference

The prevalence of central obesity (Males: WC ≥ 90cm and Females: WC ≥ 80 cm) was 29 % in men and 55 % in women. On an average, the mean waist-to-hip ratio was 0.89 in men and 0.83 in women (not shown in Tables). Tables (16-17) present the mean waist circumference and hip circumference by age groups and gender. The mean waist circumference was significantly lower in youngest age group in comparison with other age-groups. The highest mean hip circumference was found among 45-54 year age-groups in males.

Table 16. Mean waist circumference by age and genders among 25-74 years old citizens of urban Yangon

Age Group Years	Mean Waist circumference								
	Male			Female			Both Genders		
	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
25-34	75	76.6	(73.9-79.2)	67	73.7	(71.3-76.0)	142	75.2	(73.4-77.0)
35-44	61	83.2	(80.1-86.4)	99	80.8	(78.7-82.9)	160	81.7	(79.9-83.5)
45-54	79	85.6	(83.3-88.0)	92	84.8	(82.4-87.3)	171	85.1	(83.4-86.9)
55-64	96	84.8	(82.6-87.1)	82	84.7	(82.3-87.1)	178	84.7	(83.1-86.4)
65-74	65	85.2	(82.3-88.0)	39	86.1	(82.5-89.7)	104	85.4	(83.3-87.7)
Total	376	83.1	(82.0-84.3)	379	81.9	(80.7-83.1)	755	82.5	(81.7-83.4)

*Mean in Centimeter.

Table 17. Mean hip circumference by age and genders among 25-74 years old citizens of urban Yangon

Age Group Years	Mean Hip circumference								
	Male			Female			Both Genders		
	N	Mean	95% CI	N	Mean	95% CI	N	Mean	95% CI
25-34	75	90.0	(88.2-91.9)	67	94.3	(92.3-96.4)	142	75.2	(73.4-77.0)
35-44	61	93.4	(91.0-95.7)	99	98.8	(96.9-100.8)	160	81.7	(79.9-83.5)
45-54	79	95.9	(93.8-97.9)	92	100.4	(97.9-102.9)	171	85.1	(83.4-86.9)
55-64	96	93.8	(91.8-95.7)	82	99.3	(97.0-101.7)	178	84.7	(83.1-86.4)
65-74	65	94.7	(92.2-97.2)	39	98.9	(95.8-101.9)	104	85.4	(83.3-87.7)
Total	376	93.6	(92.6-94.5)	379	94.3	(92.3-96.4)	755	96.1	(95.3-96.8)

*Mean in Centimeter.

3.8 Blood pressure

The prevalence of hypertension was 48% with no difference between genders (Table 18). The prevalence of hypertension increased with increasing age. The highest prevalence (76%) was observed among the oldest age group. About one-third of the study population had the history of hypertension (29 % in males and 37% in females (not shown in Tables). The mean systolic blood pressure was 132.0 mmHg (133.6 in males and 130.0 in females) and the mean diastolic blood pressure was 82.0 mmHg (82.6 in males and 81.4 in females)(not shown in Tables).

Table 18. Hypertension and self-reported hypertension by age and genders among 25-74 years old citizens of urban Yangon

Age Group (Years)	Male			Female			Both Genders		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
25-34	75	18.7	(10.6-29.3)	67	9.0	(3.4-18.5)	142	14.1	(8.8-20.9)
35-44	61	39.3	(27.1-52.7)	99	39.4	(29.7-49.)	160	39.4	(31.8-47.4)
45-54	79	50.6	(39.1-62.1)	92	54.3	(43.6-64.8)	171	52.6	(44.9-60.3)
55-64	96	58.3	(47.8-68.3)	82	68.3	(57.1-78.1)	178	62.9	(55.4-70.0)
65-74	65	72.3	(59.8-82.7)	39	82.1	(66.5-92.5)	104	76.0	(66.6-83.8)
Total	376	48.1	(43.0-53.3)	379	48.3	(43.1-53.4)	755	48.2	(44.6-51.8)

Hypertension was defined as systolic blood pressure (SBP) ≥140 mmHg and/ or diastolic blood pressure (DBP) ≥90 mmHg, and/or self-reported current anti-hypertensive treatment for hypertension within 2 weeks prior to the interview.

Table (19) presents the blood pressure status according to the awareness, treatment and control. Among people with hypertension, 68 % were aware of their diagnosis; 28 % were controlled by anti-hypertensive drugs. 43% of previously diagnosed respondents did not take medication, of whom, 46% were males and 42% were females. With regard to gender, awareness, taking anti-hypertensive treatment and situation being controlled was higher in females compared to males.

Table 19. Prevalence of hypertension, its awareness, treatment and control by genders among 25-74 years old citizens of urban Yangon

	Raised blood pressure		Awareness of Hypertension		Current on Treatment		Being controlled	
	N	%	N	%	N	%	N	%
Male (n=376)	181	48.1	107	59.1	59	32.5	42	23.2
Female (n=379)	183	48.3	141	77.0	83	45.3	60	32.7
Total (n=755)	364	48.2	248	68.1	142	39.0	102	28.0

Raised blood pressure was defined as SBP ≥140 mmHg and/ or DBP ≥90 mmHg.
Awareness of hypertension was defined as self-reported of a prior diagnosis by medical doctor or health workers.
Treatment of hypertension was defined as the use of anti-hypertensive drugs for hypertension within 2 weeks prescribed by the medical doctors or health workers.
Control of hypertension was regarded as SBP<140 and/or DBP<90 mmHg among those currently on treatment with a previous history of Hypertension.

3.9 Fasting blood glucose

Mean fasting blood glucose was 5.9 mmol/L ±1.9 (95%CI:5.8-6.1 mmol/L), and stratification by genders showed no significant difference. The highest mean value (6.9 mmol/L) was found among 55-64 males (not shown in Tables).

Regarding crude prevalence, Table (20) shows that the prevalence of Diabetes Mellitus was 18% among both genders. Diabetes Mellitus increased with age in both genders. The oldest female group had the highest prevalence (43%).

Table 20. Diabetes Mellitus and self-reported DM by age and genders among 25-74 years old citizens of urban Yangon

Age Group (Years)	Male			Female			Both Genders		
	n	DM	95%CI	n	DM	95%CI	n	DM	95%CI
25-34	60	0.0	-	63	4.8	(1.0-13.3)	123	2.4	(0.5-7.0)
35-44	54	1.9	(0.1-9.9)	91	11.0	(5.4-19.3)	145	7.6	(3.9-13.2)
45-54	74	14.9	(7.7-25.0)	86	14.0	(7.4-23.1)	160	14.4	(9.3-20.8)
55-64	87	33.3	(23.6-44.3)	79	29.1	(19.4-40.4)	166	31.3	(24.4-39.0)
65-74	65	30.8	(19.9-43.5)	37	43.2	(27.1-60.5)	102	35.3	(26.1-45.4)
Total	340	17.9	(14.1-22.5)	356	18.0	(14.2-22.5)	696	18.0	(15.2-21.1)

Diabetes Mellitus (DM) was defined as a fasting blood glucose level of 7 ≥ mmol/L and self-reported of a prior diagnosis by medical doctor or health workers.

Table (21) presents the prevalence of diabetes and its awareness, treatment and control status. The percentage of awareness of diabetes was 63%, of them; about half was on medication with 22% being controlled. More females than males were aware of their diagnosis, however, there was no difference in being controlled status.

Table 21. Prevalence of DM, its awareness, treatment and control by genders among 25-74 years old citizens of urban Yangon

	Raised FBS		Awareness of Diabetes		Current on Treatment		Being controlled	
	N	%	N	%	N	%	N	%
Male (n=340)	61	17.9	33	54.0	27	44.2	13	21.3
Female (n=356)	64	18.0	45	70.0	34	53.1	14	21.8
Total (n=696)	125	18	78	62.4	61	48.8	27	21.6

Awareness of Diabetes Mellitus was defined as a prior diagnosis by medical doctor or health workers.
Treatment of DM was defined as on the medication of DM prescribed by the medical doctors or health workers.
Control of DM was regarded as a fasting blood glucose level of < 7mmol/L among those currently on treatment with a previous history of DM.

3.10 Fasting Lipid Profiles

The mean total cholesterol level was 5.43 mmol/L (5.49 mmol/L in males and 5.37 mmol/L in females) (not shown in Tables).

Table (22) displays the prevalence of the abnormal lipid values by genders and age-standardized rate adjusted to the WHO world population. The prevalence of high total cholesterol ((≥6.2 mmol/L) was 18.1% standardized adjusted to the WHO world population. When hypercholesterolemia was defined as ≥ 5.17 mmol/L of total cholesterol, the prevalence was 56.6 % (62.7 % in males and 50.7% in females). Furthermore, high triglycerides was prevalent at 22.0%, low HDL 59.7%, and finally high HDL 4.6%.

Table 22. Prevalence of abnormal lipid profiles by genders among 25-74 years old citizens of urban Yangon

Blood Lipids	Male (n=338) n(%)	Female (n=353) n(%)	Total (n=691) N(%)	Age-standardized (WHO)
Total Cholesterol				
Normal(<5.0 mmol/L)	115(34.0)	164(46.5)	279(40.4)	44.3
Moderate(5.0-6.1 mmol/L)	151(44.7)	120(34.0)	271(39.2)	37.6
High(≥6.2 mmol/L)	72(21.3)	69(19.5)	141(20.4)	18.1
Hypercholesterolemia (≥5.17 mmol/L)	212(62.7)	179(50.7)	391(56.6)	52.6
Triglyceride				
Normal(<2.0 mmol/L)	238(70.4)	284(80.5)	522(75.5)	78.0
High(≥2.0 mmol/L)	100(29.6)	69(19.5)	169(24.5)	22.0
HDL				
Normal(Male:≥1.03 ,Female ≥ 1.29)mmol/L	224(66.3)	80(33.7)	304(44.0)	40.3
Low(Male:<1.03,Female <1.29)mmol/L	114(22.7)	273(77.3)	387(56.0)	59.7
LDL				
Normal <4.13 mmol/L	227(82.0)	282(79.9)	559(80.9)	82.6
Medium =4.13-4.9 mmol/L	49(14.5)	46(13)	95(12.6)	12.8
High >4.91 mmol/L	12(3.2)	25(6.6)	37(4.9)	4.6

Table 23. The association between socio-demographic and selected risk factors and [€]hypercholesterolemia by binary logistic regression analysis

Characteristics	Univariate Analysis			Multivariate Analysis		
	[c]OR	95% CI	P-value	[a]OR	95% CI	P-value
Gender:						
Male	Ref.			Ref.		
Female	0.61	(0.45-0.83)	0.001*	0.79	(0.45-1.16)	0.318
Age:						
25-34	Ref.			Ref.		
35-44	1.26	(0.77-2.05)	0.356	1.24	(0.72-2.14)	0.434
45-54	2.43	(1.49-3.93)	<0.001*	2.41	(1.38-4.19)	0.002*
55-64	3.25	(2.00-5.30)	<0.001*	3.43	(1.86-6.33)	<0.001*
65-74	2.89	(1.68-4.99)	<0.001*	3.45	(1.58-7.50)	<0.001*
Education:						
Primary	Ref.			Ref.		
Middle	0.94	(0.66-1.35)	0.750	0.84	(0.56-1.28)	0.419
Higher	0.71	(0.48-1.07)	0.098	0.60	(0.36-0.99)	0.049*
Occupation :						
Employment	Ref.			Ref.		
Unpaid	1.04	(0.73-1.49)	0.827	1.17	(0.73-1.87)	0.513
Retired and unemployment	1.43	(0.98-2.10)	0.067	0.92	(0.53-1.60)	0.769
Income:						
<1USD per day	Ref.			Ref.		
1-2USD per day	0.76	(0.42-1.37)	0.361	0.93	(0.54-1.60)	0.796
2-5 USD per day	0.58	(0.35-0.95)	0.029*	1.46	(0.84-2.53)	0.175
>5 USD per day	0.80	(0.49-1.30)	0.374	2.47	(1.23-4.95)	0.011*
Tobacco use:						
Non-user	Ref.			Ref.		
Tobacco user	1.62	(1.19-2.21)	0.002*	1.90	(1.24-2.89)	0.003*
Alcohol :						
Non-user	Ref.			Ref.		
Current drinker	1.20	(0.77-1.88)	0.426	0.95	(0.54-1.68)	0.865

Fruits &Vegetables intake						
≥5 servings per day	Ref.			Ref.		
Less than 5 servings per day	1.17	(0.79-1.74)	0.442	1.35	(0.87-2.11)	0.182
Physical activity:						
≥ 600 MET-minutes	Ref.			Ref.		
Low Physical activity	1.35	(0.86-2.14)	0.197	1.30	(0.76-2.24)	0.342
BMI-						
normal	Ref.			Ref.		
Overweight and Obesity	1.28	(0.94-1.75)	0.123	1.38	(0.96-1.98)	0.086
Underweight	0.85	(0.46-1.57)	0.595	0.75	(0.38-1.50)	0.416
Hypertension-						
No	Ref.			Ref.		
Yes	1.59	(1.18-2.16)	0.003*	1.23	(0.84-1.79)	0.293
Diabetes-						
No	Ref.			Ref.		
Yes	1.22	(0.82-1.83)	0.318	0.83	(0.52-1.34)	0.452

[€]Hypercholesterolemia: total cholesterol ≥ 5.17 mmol/L, [c]OR, crude odd ratio, [a]OR, adjusted odd ratio,

3.11 The association between socio-demographic and selected risk factors and hypercholesterolemia

Table (23) presents the association between hypercholesterolemia and socio-demographic and selected risk factors of NCDs. In multiple regression analysis showed high age and tobacco-use, and low education as compared with higher education, and low income as compared with high income of >5 USD per day were associated with hypercholesterolemia after adjusting for all variables in table. In separate analyses (not shown in Tables) using total cholesterol ≥ 5.0 mmol/L as cut off, there were similar results as presented in the Table (23).

According to the Nagelkerke R-square, the variance was 14%, i.e the included variables explained 14% of the variation in hypercholesterolemia.

3.12 Combined NCD risk factors

Based on the WHO STEPS methodology, the combined exposure of five common risk factors including current daily smokers, less than five serving of fruits and vegetables per day, low physical activity, overweight (BMI≥25 kg/m^2), hypertension (SBP ≥ 140 and/or DBP ≥ 90 mmHg or currently on treatment) was employed to determine population risk for non-

communicable diseases [77]. Table (24) shows the summary of the combined risks factors by genders. 3.3% of the population had no risk factors while 65% had 1-2 risk factors and 32 % had three or more risk factors.

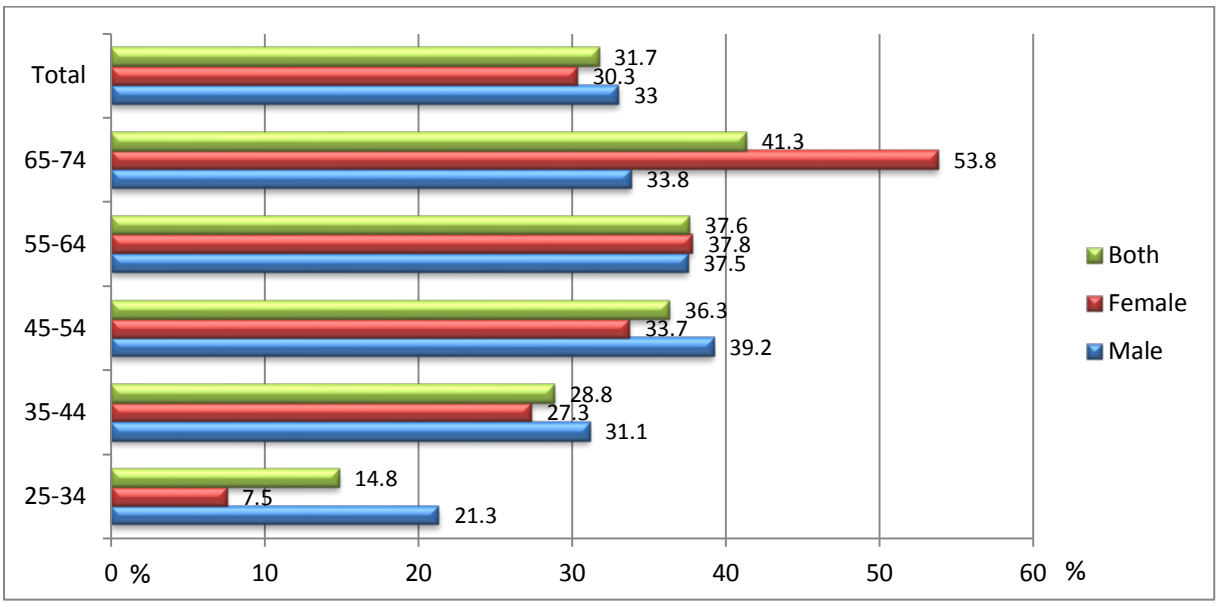
Table 24. Combined NCD risk factors by genders among 25-74 years old citizens of urban Yangon

	Male		Female		Both Genders	
	%	95% CI	%	95% CI	%	95% CI
0 risk factor	2.4	(1.2-4.7)	4.2	(2.5-6.9)	3.3	(2.2-4.9)
1-2 risk factors	64.6	(59.5-69.4)	65.4	(60.4-70.2)	65.0	(61.5-68.4)
3-5 risk factors	33.0	(28.3-38.0)	30.3	(25.8-35.3)	31.7	(28.4-35.1)

Current daily smokers, less than 5 serving of fruits and vegetables per day, low physical activity (<600 MET-minutes), overweight and obese (BMI≥25kg/m^2), raised BP (SBP≥140 and/or DBP≥90 mmHg or currently on medication for raised BP) were considered to count the number of risk factors present.

The prevalence of 3-5 risk factors of the population with age-group and genders is demonstrated in Figure (3).

Figure 3. Prevalence of three or more NCD risk factors by age and genders among 25-74 years old citizens of urban Yangon



3 or more risk factors of ;current daily smokers, less than 5 serving of fruits and vegetables per day, low physical activity (<600 MET-minutes), overweight and obesity (BMI≥25kg/m^2), Raised BP (SBP≥140 and/or DBP≥90 mmHg or currently on medication for raised BP)

3.13 Framingham coronary heart disease risk score

According to the Framingham risk score, 47.3% males and 28% females were estimated to have more than 10% chance of developing CHD during the next 10 years. After age-adjustment to the WHO world standard population, the adjusted estimates were 33.2% and 22.2% for males and females, respectively.

3.14 Summary of the prevalence of NCD risk factors among 25-74 years old citizens of urban Yangon

Table (25) presents a summary of the risk factors for NCDs by gender and total, and with adjustment to the WHO standard population. We detected high prevalences of hypercholesterolemia (52.6%), overweight and obesity (42.6%), hypertension (42%), Diabetes Mellitus (13.8%), and the smoking prevalence was high (in males) and 82.9% consumed lower level of fruits and vegetables than recommended.

Table 25. **Summary of the prevalence of NCDs risk factors among 25-74 years old citizens of urban Yangon**

	Male	Female	Both Genders	Age-standardized %	95% CI
Current smokers	43.4	3.7	23.4	24.3	(21.2-27.4)
Current drinkers	26.9	1.3	14.0	16.0	(13.4-18.6)
Binge drinking	11.2	0.3	5.7	7.2	(5.4-9.0)
Low fruits and Vegetables intake	80.1	84.4	82.3	82.9	(80.2-85.6)
Low physical activity	15.4	11.6	13.5	12.4	(10.0-14.8)
Overweight and obesity	35.1	52.8	44	42.6	(39.1-46.1)
Obesity	7.7	19.0	13.4	12.4	(10.0-14.8)
Hypertension	48.1	48.3	48.2	42.0	(38.5-45.5)
Raised fasting blood glucose	12.4	11.3	11.8	8.6	(6.5-10.7)
Diabetes Mellitus	17.9	18.0	18.0	13.8	(11.2-16.4)
Hypercholesterolemia	62.7	50.7	56.6	52.6	(48.9-56.3)

Current smokers- currently smoke daily or less than daily, alcohol drinkers- current drinker within 30 days, Binge drinking- 5 or more standard drinks for males and 4 or more for females, Low fruits and Vegetables intake < 5 servings of fruits and/or vegetables on an average per day**,** Low physical activity (<600 MET-minutes per week), overweight (BMI 25-29.9kg/m^2) and obesity (BMI≥30kg/m^2), Hypertension (SBP≥140 and/or DBP≥90 mmHg or currently on medication for raised BP), Raised FBS ≥ 7.0 mmol/L, Diabetes Mellitus: Raised FBS ≥ 7.0 mmol/L and/or history of Diabetes Mellitus, Hypercholesterolemia ≥ 5.17 mmol/L of total cholesterol.

CHAPTER IV

DISCUSSION AND CONCLUSION

4. DISCUSSION

4.1 Summary of the findings

The present study provides the magnitude of risk factors of non-communicable diseases among citizens residing in Urban Yangon Region, the largest urban area of Myanmar. The cross-sectional study used WHO STEP survey methodology adapted to the local context similar to the method used in a previous study conducted in Yangon in 2003-2004.

The main findings of the present study was the high prevalence of NCDs risk factors, and based on Framingham risk scores, 33.2% of males and 22.2% of females had a moderate to high risk of developing CHD the next 10 years. Furthermore, we report an alarming high prevalence of hypercholesterolemia of 56.6%. In multivariable analysis, we found that high age, low education, low income and tobacco use were associated with hypercholesterolemia. We also detected that 32 % of the total respondents lived with three or more risk factors of NCDs among the study population.

4.2 Methodology

The present study employed a cross-sectional study design. Cross-sectional studies collect simultaneously both the exposure status and outcome status at a single point in time [78].

The present study was intended to estimate the burden of NCD risk factors and to investigate the association between hypercholesterolemia and selected risk factors. Since the cross-sectional design provides the prevalence of diseases and other risk factors, the design meets the objective of the present study. The disadvantage of the cross-sectional study limits the assessment of the temporal relationship between exposure and outcome. Like other epidemiological studies, the present study has certain limitations and weaknesses. Random error, selection problem, information problem and confounding are the potential sources of the errors in present study.

4.2.1 Validity and reliability

Validity is defined as the accuracy and appropriateness of the inferences from the analysis of the data, whereas reliability is defined as the consistency of measurements in the study [79].

The threats of the validity could be introduced in all epidemiological studies, therefore, they must be minimized in order to have the highest validity of the result of a study. There are two types of validity namely, internal validity and external validity.

The internal validity refers to the degree to which it can be assumed that changes in the independent variable caused changes in the dependent variable [79]. The external validity refers to generalization of the findings and will be discussed later in this chapter.

There are commonly two types of errors that can affect the epidemiological studies, namely random errors and systematic errors [80]. These errors are classified based on the selection of participants for study or comparison and the measurement of exposures and/or outcomes [80]. Random error or poor precision is the variability of in the data which occur by chance [81]. In order to reduce random error in a study, the sample size could be increased. In the present study, we have performed sample size calculation and presented figures with 95% confident interval.

Systematic error happens systematically through variation of the measurements from the accuracy [80]. It is also known as bias, and classified broadly into 3 categories : selection bias, information bias and confounding [81].

4.2.2 Selection bias

Occurrence of random and systematic sampling errors depends on the way of selection the subjects in a study. Selection bias is a systematic error between those who are included in a study and those who are not, or when study and comparison groups are not selected in a proper way [80].

Selection bias can be introduced if there is no random selection of participants into the study and when those invited to a study refuse to participate in a systematic manner. For example, that those with most exposures and/or diseases refuse to participate or are not invited through random procedures. In the present study participants were invited to the study through random procedures. The response rate was high at 94% in STEP 1 and 2, and 86% in STEP 3. It is unlikely that selection problem have affected prevalence estimates in STEP 1 and 2 and association measures (OR) significantly.

Prevalence estimates from STEP 3, i.e –estimates, from the blood analyses, could be biased due to selection. However it is not possible to indicate which direction estimate are eventually distorted. Association measures are more robust to selection problems than prevalence estimates [82] [83]. So it is unlikely, with response rate of 86%, that the estimates of ORs in

analyses of risk factors association with hypercholesterolemia are biased. In the present study multistage cluster sampling method was employed in order to achieve a representative sample of the study population.

In order not to lose selected invitees, the first meeting with participants was done with the assistance of the street-leaders. The cooperation of street leaders may enhance the response rate because the leader is a trusted person in the community and he/she supported the study. Moreover, the flexible appointments of selected persons who were not at home or works reduced drop-out. During the data collection, none of the non-responder with other volunteers were replaced. In fact, due to logistic and social context, three volunteers, who were keen to be a part of the health survey, took part in the study but their data were not entered in the data files. The three volunteers received results from the examination, only.

4.2.3 Information bias

Information bias is a systematic error in measurement or by misclassifying the subject for exposure and/or outcome variables in a study [80]. The misclassification can be differential or non-differential [80]. According to Kenneth J. Rothman [81]:

"For exposure misclassification, the misclassification is non-differential if it is unrelated to the occurrence or presence of disease; if the misclassification of exposure is different for those with and without disease, it is differential. Similarly, misclassification of disease (outcome) is non-differential if it is unrelated to the exposure; otherwise. it is differential." [81]

In a prevalence study, the most common types of information bias include interviewer bias, questionnaire bias and recall bias. Interviewer bias comes when systematic differences occur while asking, recording, or interpreting of information from the participants.
The present study might have recall bias in the self-reported measures for the behavioral risk factors. Some participants, for instance, might under-report on alcohol consumption and tobacco use leading to lowering of prevalence estimates[84,85]. Physiological changes during pregnancy can alter the result of physical measurement and biomedical results [86]. We, therefore, excluded 3 pregnant female participants from the data analysis in this study.

In order to control potential information bias, a proper training was given to the fieldworkers. Furthermore, all the questionnaires were adapted to WHO STEP methodology and the

instruments were standardized before the data collection. The methods have been applied in Myanmar setting and languages in two previous studies. The questionnaire have been slightly modified and tested. However, the validity of the Myanmar version has not been validated, and is, thus, a weakness of the study.

Anthropometric measurements and the simple clinical examination were performed following the WHO standards procedures. Operational definitions were well-defined. A pilot study was conducted to standardize questionnaires and physical measurements. As a limitation, blood drawing and investigation were not included in the pre-test. Another limitation was that the validation of the blood results from National Health Laboratory was not evaluated in another laboratory. However, the National Health Laboratory, Yangon is the only main reference laboratory of Myanmar known as a WHO reference Laboratory, therefore quality control of the laboratory results were highly certified with minimum systematic error.

4.2.4 Confounding

A confounding factor is a factor that is associated with both exposure and outcome [81].
Thus, confounding is mainly related to the present analyses of the association between risk factors and hypercholesterolemia. We used a multivariate method (logistic regression analysis), controlling for confounding. There might be unmeasured confounders that were not included the study, (for instance, taking cholesterol lowering drugs, social pressure, seasonal variation). Most often such unmeasured confounders may change the estimates towards the null-value.

Regarding to the prevalence estimates, they were most often presented by age groups and genders to remove the effect of age and genders. Moreover, the prevalence of selected important risk factors was presented with age-adjustment to the WHO world standard population.

Three pregnant participants were excluded from the data analysis to avoid confounding since the physiological and metabolism changes can affect the results on physical examination and laboratory examination. We decided that 3 pregnant women were too little to make an additional stratified group.

4.3 Discussion of the main findings

4.3.1 Tobacco use

The crude prevalence of current smoking was 23% which is quite similar to urban Cambodian (24.8%) [87], and also quite similar to a previous study from urban Yangon study (25%) in 2003[23], and also similar to the 2009 national figure of Myanmar(22%) [24]. The current smoking rate was higher than that in the urban Jaipur of India (14.5%) [88], and it is lower than in the urban areas of Thailand (36%) [89] and Nepal (36%) [90]. Similar to the regional and national figures [29], current smoking prevalence in males outnumbered females and was more than 10 times higher than in females. The overall prevalence of smokeless tobacco was 28% (40% for males and 15.6% for females), which was slightly lower than that in the 2009 nationwide figure 30% (51% for males and 16 % for females) [24].

The results indicate that tobacco consumption is a public health problem in Myanmar. The implementation of law on control of smoking and consumption of tobacco products is still weak in Myanmar. As a result, tobacco advertising and promotion, easy accessibility and cheap price of tobacco product may have enhanced Myanmar's tobacco use. Additionally, smokeless tobacco use, particularly betel chewing and tobacco, is highly common in Myanmar and has become a socio-cultural entertaining habit [31]. As a matter of fact, people had the misconception that smokeless tobacco is less harmful than smoking [31,91].

4.3.2 Alcohol consumption

Similar to South-East Asian countries [13], alcohol consumption was higher among males than among females. The prevalence of current drinker (14%) was compared with national figures from 2009 (13%) [24]. Among males, the current drinking rate (27%) was similar with urban Kerala (27%) [92], and much lower than urban Kathmandu (58%) [90]. About 1 % of females were current drinkers in the present study, which was lower than from urban Kathmandu (24.9%) [90]; national figures of Bhutan (26%), and Nepal (17%) [13].

Some studies have reported that light to moderate amount of alcohol consumption enhances the cardio-protective effect [35], by increasing serum HDL level and decreasing serum LDL [36]. It does not mean that the harmful use of alcohol should be overlooked as it has several serious side effects as injuries, violence and drank-driving [34]. Binge drinking was lower than reported

in urban Cambodian (45.1% in males and 3.4% in females) [87], and could possibly be under-reported as it is socially represents poor behaviors.

4.3.3 Fruits and vegetables consumption

82% of the population did not fulfil the WHO recommends of eating more than five servings of fruits and vegetables (400g) on average in a day, which is believe to minimize the burden of NCDs [38]. A higher prevalence of adequate fruits and vegetables consumption was observed among males than females which is in accordance with other South-East-Asian Countries [13].

The prevalence of adequate fruit and vegetables consumption was found to be considerably lower than in the urban Kerala (62%) [92] and national data of Bhutan (33%) and Nepal (38%)[13]. In contrary, the present study showed a higher percentage of adequate fruits and vegetables consumption than previous studies from Myanmar in 2003-4 (92%) [23] and 2009 (90%) [24], and higher than urban Bangladesh(4%) [93], the national data of Indonesia (6%) and Maldives (3%) [13].

Unhealthy dietary intake was not a surprise in the South-East-Asian Region due to the low socioeconomic condition and poor awareness in the majority of the population. Nevertheless, an agricultural country like Myanmar could increase the consumption of fruits and vegetables due to the good availability in the country, contributing to a reduction in NCDs.

4.3.4 Physical inactivity

The prevalence of low physical activity (14%) was low as compared with urban Jaipur (70%)[88] and Kathmandu (32%) [90]. However, compared to the previous study from urban Yangon in 2003, it is an increase in the prevalence of low physical activity from 9% to 14% [23]. This could be due to the general trend of urbanization, a shift towards a more sedentary westernized lifestyle. More males than females were physically inactive in the present study, similar with Indonesia national data which reported 32% in males and 29% in females [13]. In contract, most of South-East-Asian countries [13], urban Bangladesh [93] and in the national study in Myanmar [24], more female than males were physically inactive.

The study population possessed high level of physical activities, probably; this may be due to the nature of their work and level of economic development in Myanmar. Unlike developed countries, in the present study physical activity generally occurred at work place, house

chores and transport in the present study. Probably due to poor transportation system in Yangon, city dwellers attain physical activity from the walking on a regular basis. Few attained the leisure related physical activity.

4.3.5 Body mass index (Overweight and Obesity)

A high prevalence of overweigh/obesity was reported in the present study. This is in accordance with reports from urban Jaipur (48 %) [88] and urban Palestine(41%) [94]. Similar to other South-East Asian countries [13], urban Bangladesh [93] and national data of Cambodia [87], a higher proportion of females were overweight compared to males. Nineteen percentage of females were obese (BMI $\geq$30 Kg/m^2), which was 2 times higher than 2009 national prevalence (8%) [24], and much higher than the report in the urban Yangon study in 2003 (less than 1%) [23]. The reason of surge trend of obesity was probably due to changes in dietary pattern and lifestyles.

Already in 2005 it was reported that in most developing countries the prevalence of overweight women is higher than the prevalence of underweight women [95], which is in accordance with present study. Based the suggested WHO BMI cut-off for the Asian population, the prevalence of overweight and obesity (61%) was higher than that of the standard cut-off. People in Myanmar believe that fat body could be an indicator or sign of the good health and prosperity rather than having a thin and emaciated shape. This could have led to a misunderstanding that overweight is not a risk of chronic diseases.

4.3.6 Blood pressure

A high prevalence of hypertension was observed in the present study. The age-standardized prevalence rate was 42%, which was identical with the national figure of Myanmar from 2009[24], but higher than urban Yangon from 2003 (30.5%) [23] and similar with Indonesia (41%)[96]. The findings were also quite close to age-standardized WHO estimates for the South-East-Asian region (37%) and Global(38%) [96]. The present figure was as high as compared with urban population of Jaipur (34%) [88] and Kathmandu(28%) [90]. A recent study from four townships of Myanmar reported in 2013 a hypertension prevalence of (57%) [56]. The finding of increasing trend of hypertension as compared with data for 2003 is in line with the findings in the other countries of South-East-Asia region [96].

The main reason for such a surge could probably be explained with the changes in dietary pattern and lifestyle. Studies reported that salt-intake in South-East Asian countries was very high[97]. Furthermore, the increase in use of mono-sodium glutamate (MSG) could be major contributor of the burden of hypertension. MSG and salt intake are highly associated with high blood pressure[98-100].

The mean systolic and diastolic blood pressure (132/82 mmHg) in the present study is far from the optimal blood pressure (115/75 mmHg) [101]. An increase in blood pressure by 20/10 mmHg may double the risk of CVDs [102]. Thus, the present population of adults in urban Yangon is close to having double risk of CVDs.

This study shows that hypertension is an important public health problem of urban Yangon. Although awareness among the hypertensives was 68%, the coverage of the treatment and control were poor. Better coverage of controlled hypertension were found in neighboring countries [96] such as in Thailand (43%) and in Bangladesh (42%) than the present study(28%). Although the awareness and control rate have increased from 53% to 62% and 11% to 27%, respectively, as compared to the previous study in Yangon in 2003 [45], the improvement is not sufficient. Hence, further prevention and control activities are needed. Further study of risk factors of hypertension should be conducted for identifying the preventive strategies of hypertension in Myanmar.

4.3.7 Blood glucose

The present study reported a high diabetes prevalence (18%) with no gender difference. The age-standardized prevalence was 13.8%, which is higher than reported in the previous study of Yangon in 2003 [23]. Similarly, earlier studies in Asia showed an increasing trend in diabetes prevalence, particularly in urban areas [103], a 10-fold increase from 1.2% to 12% from 1971-2000 was reported in urban India [104,105], seven-fold increase from 1990-1999 in urban Nepal [106,107], and about double-fold increase from 2001-2008 in urban areas of mainland China [103,108,109]. Urbanization and rapid changes in lifestyle in Asia could be predisposing factors for this increasing trend. It has also been suggested that Asian people have favorable ethnic and genetic conditions for poorer threshold for the environmental risk factors and increasing the risk of diabetes [103].

The findings of the present study indicated a high burden and poor control of diabetes in urban areas of Yangon. A recent study reported that the knowledge, attitude and practice of

Myanmar people with diabetes is still poor, and that people with diabetes have ineffective diabetes care because of various socio-cultural beliefs leading to denying the seriousness of the disease [110].

4.3.8 Blood lipid profiles

In line with an increasing trend of increasing cholesterol levels in South-East Asian countries [52], the total cholesterol in the present study was higher than in the Yangon study from 2003 [23]. The level was also higher than the worldwide age-standardized mean cholesterol (4.64 mmol/L in males and 4.76 mmol/L in females) [52].

The present study reports high prevalences of hypercholesterolemia and low HDL. The prevalence of raised total cholesterol level in the present study was similar to the urban Kerala (61%) [92] and national figures of Thailand and Maldives in 2008(above 50 %)[13]. However, it was higher than the previous study from Yangon in 2003 [23],and compared with an urban Cambodian study in 2010 [87]. A very high prevalence of low HDL (77%) was found among females of our study, but lower than found among females in the urban population of eastern India (85%)[111] and lower than that of Jaipur (44%) [88].

The study reports an association between hypercholesterolemia and higher age, tobacco use, low education as compared with higher education, and low income as compared with high income of >5 USD per day. This is in accordance with some studies which have shown an association between hypercholesterolemia and tobacco use [112,113] and age [114,115].

4.3.9 Combined risk factors and Framingham coronary heart disease risk score

It was observed that 3.3 % of the study population had none of the mentioned NCD risk factors, slightly lower than Myanmar national figures (4.3%) [24] and lower than urban Cambodian in 2010 (10.3%) [87]. We detected only slightly higher prevalence of 3 or more combined risk factors in males (33%) than in females (30%). This is similar to urban Katmandu (41%,31%) [90], Cambodia (14%,7%) [87], and national figures from Myanmar in 2009 [24]. The prevalence of 10 years risk of CHD was higher among males (47%) than females (28%). A recent study of four townships in Myanmar showed almost no difference between genders (50% in males and 48% in female)[56]. The high prevalence of total cholesterol and smoking among males may have contributed to the present high 10 years risk of CHDs.

4.4 External validity (Generalization)

External Validity refers to the degree to which it can be generalized from the results and inferences reached with a sample to the population[79]. High internal validity is a prerequisite for the external validity.

Regarding the prevalence estimates, the data were collected from the 6 urban townships of the Yangon region; therefore it is most possible to generalize as to the whole urban Yangon region. The difference of behavior and lifestyles between the rural and urban population is large. However, the present prevalence estimates represent the urban population of Yangon region and might be applicable for other large urban areas of Myanmar. The present data represents findings from the most urbanized area of Myanmar and could be seen as a comparison group for future studies.

The factors found to be associated with hypercholesterolemia are in accordance with previous studies; and association measures are relatively robust even if there had been some degree of selection bias (which is most likely not present in this study); and we have adjusted for the potential confounders, but, there might be some unmeasured confounders such taking lipid lowering drugs. Thus we believe that the association measures from the present study can be generalized to a wider population or to a general population.

4.5 Conclusion and the recommendation

The present study shows that the prevalences of NCD risk factors in the urban population of the Yangon region are generally high. Compared with a previous study from the same area conducted in 2003, the prevalences of the risk factors seem to be on rise. There were gender differences with higher prevalence in males than females for smoking, current alcohol drinking, and hypercholesterolemia, and lower prevalence for males regarding overweight and obesity.

Almost all adult urban citizens of Yangon have more than one the risk factors present, and one third has 3-5 risk factors present. No gender differences were found. Based on the Framingham risk estimates, more that one-fourth of the population have moderate to high risk of developing CHD within the next 10 years. Slightly more males than females belong to this risk group.

The present study indicates that there is social inequity in the occurrence of hypercholesterolemia, with higher prevalences among those with low income and education. Taken together, the findings of the present study indicate an increasing trend in NCD risk factors, that will result in an increase in NCDs. This will put an enormous pressure on the Myanmar health system, and prevention strategies should be given high priority.

We recommend that strategies to be put forward should target the whole population, and regarding smoking it is important with strategies that prevent women from starting smoking. Similar to most low income countries, there is a need to increase the level of education and income of the population, and provide health information to increase the awareness of diseases.

Detailed analysis of the present study should be published nationally to inform policy makers and NGOs and internationally to inform donors and international NGOs. Coordinated actions are needed to reduce NCDs and their risk factors. The data should be presented to the Ministry of Health for further utilization. The government should be responsible for the health of its population; to ensure that domestic financing for health is sufficient, efficient, equitable and sustainable. The Myanmar government should continue to increase the expenditure on health, perhaps increasing the speed.

An agricultural country like Myanmar should consider how to increase consumption of fruits and vegetables. Since the result showed that prevalence of some NCD risk factors are gender-related, the socio-cultural issue on preventive measures should be taken into consideration. Due to the high prevalence of hypercholesterolemia and hypertension, further studies of their associated factors should be conducted for the purpose of preventive strategies. Preventive programs aiming at reducing NCD risk factors have been conducted and evaluated in both low- and high income counties settings. Such programs could be adjusted to the local culture of Myanmar and implemented in selected areas, and the effect should be evaluated.

Programs for the raising the awareness regarding side effect of smokeless tobacco consumption, particularly betel quid chewing should be developed. This survey estimated the prevalence of NCD risk factors in urban areas of Yangon. A rural study should be conducted for comparison, and further studies should be done at later stage probably next 5 and 10 years to assess the trends of risk factors among the population.

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Appendix 1

Selected Townships and wards of the present study

(1) Mingalar-Taung-Nyunt Township (5 wards from total 20 wards)
   i. Kantawkalay –West
   ii. Taung-Nyunt-Ya-Htar
   iii. Taung lone Pyan
   iv. San Pya Pha Sa Pa Hla
   v. Thar Yar Gone

(2) Bahan (5 wards from total 22 wards)
   i. Sayar San North-East
   ii. Bo Sein Hman
   iii. Kyeik Ka San
   iv. Sar sa Na yeik thar
   v. Ye Tar Shay

(3) KamaYut (5 wards from total 10 wards)
   i. Ward 3
   ii. Ward 5
   iii. Ward 7
   iv. Ward 8
   v. Ward 1

(4) Innsein(5 wards from total 21 wards)
   i. Kan-Nar-Central
   ii. Pauk-Taw
   iii. Myo Thit (Ka+Kha)
   iv. Kyoe Kone-east
   v. Ywar ma- west

(5) South-Dagon (5 wards from total 26 wards)
   i. Ward 20
   ii. Ward 21
   iii. Ward 54
   iv. Ward 70
   v. Ward 140

(6) South-Okkalapa (5 wards from total 13 wards)
   i. Ward 4
   ii. Ward 9
   iii. Ward 7
   iv. Ward 10
   v. Ward 11

- Ward is a part of townships.

Appendix 2 Invitation to participate in the health survey

Dear Mr/Ms ……, Date:_____

We would like to invite you to participate in the health survey, which will be held in (address of the Place), at date_____(month) (day) : (hour) ____.

The general objective of this survey is to determine the potential risk factors that can affect the health especially chronic diseases (e.g cardiovascular diseases, hypertension, diabetes, etc). We would like to invite 800 men and women aged 25-74 years in the urban area of Yangon. Research period will be from September 2013 to November 2013. The researcher from the Ministry of Health, Myanmar will lead and carry out the data collection accordingly.

The ethical consideration of this survey had been cleared by Norwegian Regional Committees for Medical and Health Research Ethics (REK) and the Ethical Review Committee of Department of Health (Myanmar).

The components of the survey include interviewing about health, measurements of body weight, height, waist and hip circumference, blood pressure and taking out blood sample for testing blood glucose and lipids.

We ensure that all of participants have right to withdraw from the study any time as they wish. After completion of the study, the research team will share the examination results only with participants who want to know their results. The information you provide is totally confidential and will not be disclosed to anyone. It will only be used for research purposes. All information will be handled confidentially.

In order to obtain valid health information, please be informed you the following guidelines for blood investigation by the time you come the investigating site at the scheduled date:

1. Abstaining from all kinds of food and drink with the exception of plain water 10 hours before coming to the research site.
2. If you are on any kind of long term medications, please bring them with your medical history book to research site to show to the research team.

Thanking you in anticipation of your kind cooperation.

With regards,

Dr. Aung Soe Htet
Principal Investigator
Ministry of Health
09-31240299

ကျန်းမာရေးစစ်တမ်းသုတေသနတွင် ပါဝင်ရန် ဖိတ်ကြားလွှာ

သို့ နေ့စွဲ .....

ဦး/ဒေါ်.....ခင်ဗျား။

.....နေ့.....အချိန်.....တွင်ကျင်းပပြု လုပ်မည့်ကျန်းမာရေးစစ်တမ်းကောက်ယူမှုတွင် လူကြီးမင်းမှ လာရောက်ပါဝင်ကူညီပါရန် လေးစားစွာဖိတ်ကြားအပ်ပါသည်။

ကျန်းမာရေးစစ်တမ်း၏ အဓိကရည်ရွယ်ချက်မှာ (နလုံး၊ သွေးတိုး၊ ဆီးချိုအစရှိသည့်) မကူးစက်တတ်သော နာတာရှည်ရောဂါများဖြစ်ပွားစေနိုင်သည့် ရောဂါဖြစ်နိုင်ခြေအချက်အလက်များကို သိရှိနိုင်ရန် ဖြစ်ပါသည်။ ကျန်းမာရေးစစ်တမ်းတွင်ရန်ကုန်တိုင်း၊ မြို့ပေါ်ရပ်ကွက်များတွင် နေထိုင်သောအသက် ၂၅နှစ်မှ ၇၄နှစ် ကြားအရွယ်ရှိ အမျိုးသား၊ အမျိုးသမီးစုစုပေါင်းအယောက်(၈၀၀)ကိုပါဝင်နိုင်ရန် ဖိတ်ကြားမည် ဖြစ်ပါသည်။အဆိုပါစစ်တမ်းကို ကျန်းမာရေးဝန်ကြီးဌာန လက်အောက်ရှိသုတေသီများမှ ဦးစီးပြီး ၂၀၁၃ခုနှစ်၊ စက်တင်ဘာလမှ နိုဝင်ဘာလအတွင်း ကောက်ယူသွားမည်ဖြစ်ပါသည်။

ကျန်းမာရေးစစ်တမ်း၏ ကျင့်ဝတ်ဆိုင်ရာအခြေခံသဘောများကို နော်ဝေးနိုင်ငံနှင့် မြန်မာနိုင်ငံ၊ ကျန်းမာရေးဦးစီးဌာနတို့၏ သုတေသနကျင့်ဝတ်ဆိုင်ရာအဖွဲ့အစည်းများမှ ထောက်ခံချက်ရယူပြီး ဖြစ်ပါသည်။ စစ်တမ်းတွင်ပါဝင်မည့်သူများကို ကျန်းမာရေးဆိုင်ရာအချက်အလက်များ မေးမြန်းခြင်း၊ တိုင်းတာခြင်းနှင့် သွေးဖောက်စစ်ဆေးခြင်းများ ပါဝင်မည်ဖြစ်ပါသည်။

စစ်တမ်းတွင်ပါဝင်မည့်သူများသည် စစ်တမ်းကောက်ခံနေစဉ်အတွင်း ဆက်လက်မပါဝင်လိုပါက အချိန်မရွေး၊ မိမိစိတ်တိုင်းကျ နှုတ်ထွက်ခွင့်ရှိပါသည်။ကျန်းမာရေးစစ်တမ်းအတွင်း ရရှိသောအချက်အလက်များကိုကျန်းမာရေးသုတေသနစာတမ်းတွင်သာ အသုံးပြုမည်ဖြစ်ပြီး၊ လုံခြုံသောနေရာတွင် အထူးလျှို့ဝှက်ထိန်းသိမ်းထားမည်ဖြစ်ပါသည်။သို့သော်ကာယကံရှင်က မိမိ၏ကျန်းမာရေးဆေးစစ်ချက်များကို သိရှိလိုပါက သုတေသီများမှ ရလဒ်အဖြေများကို အသိပေးသွားမည်ဖြစ်ပါသည်။

စစ်တမ်းတွင်ပါဝင်မည့်သူများသည် ဆေးစစ်ချက်များတိကျသေချာစေရန်အတွက် အောက်ဖော်ပြပါ ညွှန်ကြားချက်များကို လိုက်နာဆောင်ရွက်ပေးပါရန် အသိပေးတင်ပြအပ်ပါသည်။

၁။သွေးဖောက်စစ်မည့်နေ့၊ မနက်မတိုင်မီညည(၁၀)နာရီမှစပြီး အစာမစားဘဲ၊ အရည်မသောက်ဘဲ(ရိုးရိုးရေမှလွဲ၍) ချိန်းဆိုရာနေရာသို့လာရောက်သွေးစစ်ခံယူပါရန်၊

၂။စွဲမြဲသောက်သုံးနေရသောဆေးဝါးများရှိပါက ဆေး/ရောဂါမှတ်တမ်းနှင့်တကွ စုရပ်သို့ ယူဆောင်လာပါရန်၊

ပူးပေါင်းပါဝင်ဆောက်ရွက်မည့်အတွက်အထူးကျေးဇူးတင်ရှိပါသည်။

လေးစားစွာဖြင့်

ဒေါက်တာအောင်စိုးထက်
Principal Investigator
ကျန်းမာရေးဝန်ကြီးဌာန
ဖုန်း၊ ၀၉၃၁၂၄၀၂၉၉

Appendix 3

NCD RISK FACTORS SURVEY IN URBAN AREA OF YANGON, MYANMAR

Survey Information			
Location and Date		**Response**	**Code**
1	Cluster/Centre/Village ID	⌊_⌊_⌋	I1
2	Name of Township		I2
3	Interviewer ID	⌊_⌊_⌋	I3
4	Date of completion of the instrument	⌊_⌊_⌋ ⌊_⌊_⌋ ⌊_⌊_⌊_⌊_⌋ dd mm year	I4

✂ ✂

		Participant Id Number ⌊_⌊_⌋ ⌊_⌊_⌋ ⌊_⌊_⌋	
Consent, Interview Language and Name		**Response**	**Code**
5	Consent has been read and obtained	Yes 1 No 2 **If NO, END**	I5
6	Interview Language (Myanmar)	**Myanmar** 1 [Add others] 2 [Add others] 3 [Add others] 4	I6
7	Time of interview (24 hour clock)	⌊_⌊_⌋ : ⌊_⌊_⌋ hrs mins	I7
8	Participant Name		I8
Additional Information that may be helpful			
9	Contact phone number where possible		I1

Record and file identification information (I5 to I10) separately from the completed questionnaire.

Participant Identification Number ⌊_⌊_⌋ ⌊_⌊_⌋ ⌊_⌊_⌋

Step 1 Demographic Information

CORE: Demographic Information			
Question		**Response**	**Code**
10	Sex (*Record Male / Female as observed)*	Male 1 Female 2	C1
11	What is your date of birth? *Don't Know 77 77 7777*	⌊_⌊_⌋ ⌊_⌊_⌋ ⌊_⌊_⌊_⌊_⌋ *If known, Go to C4* dd mm year	C2
12	How old are you?	Years ⌊_⌊_⌋	C3
13	In total, how many years have you spent at school or in full-time study (excluding pre-school)?	Years ⌊_⌊_⌋	C4

EXPANDED: Demographic Information			
14	What is the **highest level of education** you have completed? *[INSERT COUNTRY-SPECIFIC CATEGORIES]*	No formal schooling 1 Less than primary school 2 Primary school completed 3 Secondary school completed 4 High school completed 5 College/University completed 6 Post graduate degree 7 Refused 88	C5
15	What is your [*insert relevant ethnic group / racial group / cultural subgroup / others*] **background**?	[*Burma]* 1 [Kachin*]* 2 [*Kaya]* 3 Refused 88	C6
16	What is your **marital status**?	Never married 1 Currently married 2 Separated 3 Divorced 4 Widowed 5 Refused 88	C7
17	Which of the following best describes your **main work**	Government employee 1 Non-government employee 2	C8

	status over the past 12 months? [*INSERT COUNTRY-SPECIFIC CATEGORIES*] (*USE SHOWCARD)*	Self-employed 3 Non-paid 4 Student 5 Homemaker 6 Retired 7 Unemployed (able to work) 8 Unemployed (unable to work) 9 Refused 88	
18	How many people older than 18 years, including yourself, live in your household?	Number of people ⌊_⌋⌊_⌋	C9
19	Taking **the past year**, can you tell me what the average earnings of the household have been? *(RECORD ONLY ONE, NOT ALL 3)*	Per week ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋	C10a
		OR per month ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋	C10b
		OR per year ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋	C10c
		Refused 88	C10d

Step 1 Behavioural Measurements

CORE: Tobacco Use

Now I am going to ask you some questions about various health behaviours. This includes things like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with tobacco.

Question		Response	Code
20	Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes? *(USE SHOWCARD)*	Yes 1 No 2 *If No, go to T6*	T1
21	Do you currently smoke tobacco products **daily**?	Yes 1 No 2 *If No, go to T6*	T2
22	How old were you when you **first started** smoking daily?	Age (years) Don't know 77 ⌊_⌋⌊_⌋ *If known, go to T5a*	T3
23	Do you remember how long ago it was? *(RECORD ONLY 1, NOT ALL 3)*	In Years ⌊_⌋⌊_⌋ *If known, go to T5a*	T4a
		OR in Months ⌊_⌋⌊_⌋ *If known, go to T5a*	T4b
		OR in Weeks ⌊_⌋⌊_⌋	T4c

	Don't know 77		
24	On average, **how many** of the following do you smoke each day? *(RECORD FOR EACH TYPE)* *Don't know 77*	Manufactured cigarettes └┴┘	T5a
		Hand-rolled cigarettes └┴┘	T5b
		Pipes full of tobacco └┴┘	T5c
		Cigars, cheroots, cigarillos └┴┘	T5d
		Other └┴┘ *If Other, go to T5other, else go to T9*	T5e
		Other (please specify): └┴┴┴┴┴┴┴┴┘ *Go to T9*	T5other

EXPANDED: Tobacco Use			
Question		**Response**	**Code**
25	In the past, did you **ever** smoke **daily**?	Yes 1 No 2 *If No, go to T9*	T6
26	How old were you when you **stopped** smoking **daily**?	Age (years) └┴┘ *If Known, go to T9* Don't Know 77	T7
27	Do you remember how long ago it was? *(RECORD ONLY 1, NOT ALL 3)* *Don't know 77*	In Years └┴┘ *If Known, go to T9*	T8a
		OR in Months └┴┘ *If Known, go to T9*	T8b
		OR in Weeks └┴┘	T8c
28	Do you **currently use** any **smokeless tobacco** such as [*snuff, chewing tobacco, betel*]? *(USE SHOWCARD)*	Yes 1 No 2 *If No, go to T12*	T9
29	Do you **currently use smokeless tobacco** products **daily?**	Yes 1 No 2 *If No, go to T12*	T10
30	On average, how many **times a day** do you use ….	Snuff, by mouth └┴┘	T11a
		Snuff, by nose └┴┘	T11b

	(RECORD FOR EACH TYPE, USE SHOWCARD) *Don't Know 77*	Chewing tobacco └┴┘	T11c
		Betel, quid └┴┘	T11d
		Other └┴┘ *If Other, go to T11 other, else go to T13*	T11e
		Other (specify) └┴┴┴┴┴┘ *Go to T13*	T11other
31	In the past, did you **ever use** smokeless tobacco such as *[snuff, chewing tobacco, or betel]* **daily**?	Yes 1 No 2	T12
		Don't know or don't work in a closed area 77	

CORE: Alcohol Consumption

The next questions ask about the consumption of alcohol.

Question		Response	Code
32	Have you **ever** consumed an alcoholic drink such as beer, wine, spirits, fermented cider or *[add other local examples]*?	Yes 1 No 2 *If No, go to D1*	A1a
33	Have you consumed an alcoholic drink within the **past 12 months**?	Yes 1 No 2 *If No, go to D1*	A1b
34	During the past 12 months, **how frequently** have you had at least one alcoholic drink? *(READ RESPONSES, USE SHOWCARD)*	Daily 1 5-6 days per week 2 1-4 days per week 3 1-3 days per month 4 Less than once a month 5	A2
35	Have you consumed an alcoholic drink within the **past 30 days**?	Yes 1 No 2 *If No, go to D1*	A3
36	During the past 30 days, on how many **occasions** did you have at least one alcoholic drink?	Number Don't know 77 └┴┘	A4

37	During the past 30 days, when you drank alcohol, **on average**, how many **standard alcoholic drinks** did you have during one drinking occasion? *(USE SHOWCARD)*	Number Don't know 77 ⌊_⌋⌊_⌋	A5
38	During the past 30 days, what was the **largest number** of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?	Largest number Don't Know 77 ⌊_⌋⌊_⌋	A6
39	During the past 30 days, how many times did you have for **men**: **five or more** for **women**: **four or more** standard alcoholic drinks in a single drinking occasion?	Number of times Don't Know 77 ⌊_⌋⌊_⌋	A7

EXPANDED: Alcohol Consumption			
40	During the past 30 days, when you consumed an alcoholic drink, how often was it with meals? Please do not count snacks.	Usually with meals 1 Sometimes with meals 2 Rarely with meals 3 Never with meals 4	A8
41	During each of the **past 7 days**, how many standard alcoholic drinks did you have each day? *(USE SHOWCARD)* *Don't Know 77*	Monday ⌊_⌋⌊_⌋	A9a
		Tuesday ⌊_⌋⌊_⌋	A9b
		Wednesday ⌊_⌋⌊_⌋	A9c
		Thursday ⌊_⌋⌊_⌋	A9d
		Friday ⌊_⌋⌊_⌋	A9e
		Saturday ⌊_⌋⌊_⌋	A9f
		Sunday ⌊_⌋⌊_⌋	A9g

CORE: Diet

The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions please think of a typical week in the last year.

Question		Response	Code
42	In a typical week, on how many days do you **eat fruit**? *(USE SHOWCARD)*	Number of days ⌊_⌋⌊_⌋ Don't Know 77 *If Zero days, go to D3*	D1
43	How many **servings** of fruit do you eat on **one** of those days? (*USE SHOWCARD)*	Number of servings ⌊_⌋⌊_⌋ Don't Know 77	D2
44	In a typical week, on how many days do you **eat vegetables**? *(USE SHOWCARD)*	Number of days ⌊_⌋⌊_⌋ Don't Know 77 *If Zero days, go to D5*	D3
45	How many **servings** of vegetables do you eat on one of those days? *(USE SHOWCARD)*	Number of servings ⌊_⌋⌊_⌋ Don't know 77	D4

EXPANDED: Diet

46	What type of **oil or fat is most often** used for meal preparation in your household? *(USE SHOWCARD,* *SELECT ONLY ONE)*	Vegetable oil 1 Lard or suet 2 Butter or ghee 3 Margarine 4 Other 5 *If Other, go to D5other* None in particular 6 None used 7 Don't know 77	D5
		Other ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋	D5other
47	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.	Number Don't know 77 ⌊_⌋⌊_⌋	D6

CORE: Physical Activity

Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed].* In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

Question		Response	Code
Work			
48	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 4*	P1
49	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊_⌋	P2
50	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P3 (a-b)
51	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P 7*	P4
52	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊_⌋	P5
53	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P6 (a-b)
Travel to and from places			
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. *[Insert other examples if needed]*			
54	Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*	P7

55	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊_⌋	P8
56	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P9 (a-b)
Recreational activities			
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), *[Insert relevant terms]*.			
57	Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P 13*	P10
58	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊_⌋	P11
59	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P12 (a-b)
60	Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking*, [cycling, swimming, volleyball]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P16*	P13
61	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊_⌋	P14
62	How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P15 (a-b)

EXPANDED: Physical Activity
Sedentary behavior
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping.

[INSERT EXAMPLES] (USE SHOWCARD)			
63	How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs min s	P16 (a-b)

CORE: History of Raised Blood Pressure			
Question		**Response**	**Code**
64	Have you ever had your blood pressure measured by a doctor or other health worker?	Yes 1 No 2 *If No, go to H6*	H1
65	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	Yes 1 No 2 *If No, go to H6*	H2a
66	Have you been told in the past 12 months?	Yes 1 No 2	H2b

EXPANDED: History of Raised Blood Pressure			
67	Are you currently receiving any of the following treatments/advice for high blood pressure prescribed by a doctor or other health worker?		
	Drugs (medication) that you have taken in the past two weeks	Yes 1 No 2	H3a
	Advice to reduce salt intake	Yes 1 No 2	H3b
	Advice or treatment to lose weight	Yes 1 No 2	H3c
	Advice or treatment to stop smoking	Yes 1 No 2	H3d
	Advice to start or do more exercise	Yes 1 No 2	H3e
68	Have you ever seen a traditional healer for raised blood pressure or hypertension?	Yes 1 No 2	H4

69	Are you currently taking any herbal or traditional remedy for your raised blood pressure?	Yes 1 No 2	H5

CORE: History of Diabetes			
Question		**Response**	**Code**
70	Have you ever had your blood sugar measured by a doctor or other health worker?	Yes 1 No 2 *If No, go to M1*	H6
71	Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?	Yes 1 No 2 *If No, go to M1*	H7a

EXPANDED: History of Diabetes				
72	Drugs (medication) that you have taken in the past two weeks	Yes	1	H7b
		No	2	
73	Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker?			
	Insulin	Yes 1 No 2		H8a
	Special prescribed diet	Yes 1 No 2		H8b
	Advice or treatment to lose weight	Yes 1 No 2		H8c
	Advice or treatment to stop smoking	Yes 1 No 2		H8d
	Advice to start or do more exercise	Yes 1 No 2		H8e
74	During the past 12 months have you ever seen a traditional healer for diabetes or raised blood sugar?	Yes 1 No 2		H9
75	Are you currently taking any herbal or traditional remedy for your diabetes?	Yes 1 No 2		H10

Participant Identification Number ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋

Step 2 Physical Measurements

CORE: Height and Weight				
Question		**Response**		**Code**
76				M1
77	Device IDs for height and weight	Height ⌊_⌋⌊_⌋ Weight ⌊_⌋⌊_⌋		M2a M2b
78	Height	in Centimetres (cm) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋		M3
79	Weight *If too large for scale, code 666.6*	in Kilograms (kg) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋		M4
80	for women) Are you pregnant?	Yes	1	M5
		No	2	
CORE: Waist				
81	Device IDs for Waist	⌊_⌋⌊_⌋⌊_⌋		M6
82	Waist circumference	in Centimetres (cm) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋		M7
83	Hip Circumference	in Centimetres (cm) ⌊_⌋⌊_⌋⌊_⌋.⌊_⌋		M8

CORE: Blood Pressure				
84	Device ID for blood pressure	⌊_⌋⌊_⌋		M10
85	Cuff size used	Small	1	M11
		Medium	2	
		Large	3	
86	Reading 1	Systolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋		M12a
		Diastolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋		M12b
87	Reading 2	Systolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋		M13a

		Diastolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M13b
88	Reading 3	Systolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M14a
		Diastolic (mmHg) ⌊_⌋⌊_⌋⌊_⌋	M14b
89	During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2	M15
Heart Rate is (Record if automatic blood pressure device is used)			
90	Reading 1	Beat per minute ⌊_⌋⌊_⌋⌊_⌋	M8a
	Reading 2	Beat per minute ⌊_⌋⌊_⌋⌊_⌋	M8b
	Reading 3	Beat per minute ⌊_⌋⌊_⌋⌊_⌋	M8c

Step 3 Biochemical Measurements

CORE: Blood Glucose

Question		Response	Code
91	During the past 12 hours have you had anything to eat or drink, other than water?	Yes 1 No 2	B1
92	Technician ID	⌊_⌋⌊_⌋⌊_⌋	B2
93	Device ID	⌊_⌋⌊_⌋	B3
94	Time of day blood specimen taken (24 hour clock)	⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ Hours : minutes hrs mins	B4
95	Fasting blood glucose *Choose accordingly: mmol/l or mg/dl*	mmol/l ⌊_⌋⌊_⌋ . ⌊_⌋⌊_⌋	B5
		mg/dl ⌊_⌋⌊_⌋⌊_⌋ . ⌊_⌋	
		Low 1 High 2 ⌊_⌋	

		Unable to assess 3	
CORE: Blood Lipids			
96	Technician ID	└┴┴┘	B6
97	Device ID	└┴┘	B7
98	Total cholesterol *Choose accordingly: mmol/l or mg/dl*	mmol/l └┴┘.└┴┘ mg/dl └┴┴┘.└┘ Low 1 High 2 └┘ Unable to assess 3	B8

EXPANDED: Triglycerides and HDL Cholesterol			
99	Technician ID	└┴┴┘	B9
100	Device ID	└┴┘	B10
101	Triglycerides *Choose accordingly: mmol/l or mg/dl*	mmol/l └┴┘.└┴┘ mg/dl └┴┴┘.└┘	B11
102	HDL Cholesterol *Choose accordingly: mmol/l or mg/dl*	mmol/l └┘.└┴┘ mg/dl └┴┴┘.└┘ Low 1 High 2 └┘ Unable to assess 3	B12

စစ်တမ်းဆိုင်ရာအချက်အလက်

နေရာနှင့်နေ့စွဲ		အဖြေ	သင်္ကေတ
1	ရပ်ကွက်/ ကျေးရွာအည္ဆန်းနံပါတ်	⌊__⌋⌊__⌋	L1
2	မြို့နယ်အမည်	.....	L2
3	မေးမြန်းသူ၏အည္ဆန်းနံပါတ်	⌊__⌋⌊__⌋	L3
4	မေးခွန်းလွှာပြည့်စုံစွာမေးမြန်းပြီးသည့်နေ့စွဲ	⌊__⌋⌊__⌋⌊__⌋⌊__⌋ နေ့ လ နှစ်	L4

ဖြေဆိုသူ၏ အည္ဆန်းနံပါတ် ⌊__⌋⌊__⌋⌊__⌋

သဘောတူညီချက်နှင့် မေးမြန်းရာတွင်သုံးစွဲသည့်ဘာသာစကား		အဖြေ	သင်္ကေတ
5	ဖြေဆိုသူ၏ သဘောတူညီချက် ရယူပြီးပါပြီလား။	ဟုတ် 1 မဟုတ် 2	**မဟုတ်လျှင်မေးမြန်းမှု ကိုအဆုံးသတ်ပါ။** L5
6	မေးမြန်းသည့်ဘာသာစကား	မြန်မာ 1 အခြား 2 _____	L6
7	စတင်မေးမြန်းသည့်အချိန် (၂၄နာရီစနစ်ဖြင့် ဖြည့်စွက်ရန်)	⌊__⌋⌊__⌋ : နာရီ မိနစ်	L7
8	ဖြေဆိုသူ၏အမည်		L8
အသုံးကျနိုင်သည့် နောက်ထပ်သတင်းအချက်အလက်များ			
9	ဆက်သွယ်ရန်ဖုန်းနံပါတ်(ရှိလျှင်) လိပ်စာ	....	L9

မေးမြန်းပြီးစီးပါက (L5 မှ L9) အထိပါသော ဤစာမျက်နှာကို မေးခွန်းလွှာမှဖြုတ်၍ သီးခြားသိမ်းဆီးရန် ဖြစ်သည်။

Step 1 ပုဂ္ဂိုလ်ရေးဆိုင်ရာအချက်အလက်များ

လူမှုစီးပွားရေးဆိုင်ရာအချက်အလက်များ			
	မေးခွန်း	**အဖြေ**	**သင်္ကေတ**
10	လိင်(ကျား/မ)	ကျား 1 မ 2	C1
11	သင့်၏မွေးနေ့ကိုဖော်ပြပါ။ *(အကယ်၍မသိခဲ့လျှင် 77 77 7777 ဟုဖြည့်ပါ။)*	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋⌊_⌋⌊_⌋ ရက် လ နှစ် *(မွေးနေ့ကိုသိပါက မေးခွန်း 13 ကို ဆက်မေးပါ။)*	C2
12	သင်၏အသက်ဘယ်လောက်ရှိပြီလဲ။ (ပြည့်ပြီးနှစ်)	⌊_⌋⌊_⌋ နှစ်	C3
13	စုစုပေါင်းကျောင်းဘယ်နှစ်နှစ်နေခဲ့ပါသလဲ။ (မူကြို မပါ)	⌊_⌋⌊_⌋ နှစ်	C4
14	သင်အမြင့်ဆုံး အောင်မြင့်ခဲ့သော ပညာရေးအဆင့် ကိုဖော်ပြပါ။	ကျောင်းမနေဘူး 1 မူကြို မှ (၃)တန်းအောင် 2 (၄)တန်းအောင်မှ (၇)တန်းအောင် 3 (၈)တန်းအောင်မှ (၉)တန်းအောင် 4 (၁၀)တန်းအောင် 5 ကောလိပ်/တက္ကသိုလ်အောင်မြင် 6 ဘွဲ့လွန်ရပြီး 7 မဖြေဆို 88	C5
15	လူမျိုး	ဗမာ 1 ကချင် 2 ကယား 3 ကရင် 4 ချင်း 5 မွန် 6 ရခိုင် 7 ရှမ်း 8 အခြား 9 …….. မဖြေဆို 88	C6
16	အိမ်ထောင်ရေးအခြေအနေ	အိမ်ထောင်မရှိ 1 အိမ်ထောင်ရှိ 2 ကွဲကွာ 3 ကွာရှင်းထား 4 မုဆိုးဖို/မုဆိုးမ 5 မဖြေဆို 88	C7

17	လွန်ခဲ့သော(၁၂)လအတွင်း ဖော်ပြပါ အလုပ်အကိုင်တွေအနက် ဘယ်အလုပ် ကိုအဓိကအားဖြင့် လုပ်ကိုင်ခဲ့ပါသလဲ။	အစိုးရဝန်ထမ်း 1 ကုမ္ပဏီ၊ NGOဝန်ထမ်း 2 ကိုယ်ပိုင်လုပ်ငန်း 3 အလုပ်သင်/ လုပ်အားပေး 4 ကျောင်းသား 5 အိမ်ရှင်မ 6 ပင်စင်စား 7 အလုပ်လက်မဲ့ 8 အလုပ်မလုပ်နိုင် 9 မဖြေဆို 88	C8
18	သင့်အိမ်မှာ သင်အပါအဝင် အသက်(၁၈) နှစ်ပြည့်ပြီးတဲ့သူ ဘယ်နှစ်ယောက် ရှိပါသလဲ။	└─┴─┘ ဦး	C9
19	ပြီးခဲ့တဲ့နှစ်မှာသင့်အိမ်ထောင်စုရဲ့ ပျမ်းမျှဝင်ငွေ ဘယ်လောက်ရှိတယ် ဆိုတာကို ပြောပြနိုင်ပါသလား။ (ဆီလျော်သည့် အကွက်(၁)မျိုးတွင်သာ ဖြည့်ရန်)	တစ်ပတ်လျှင် └─┴─┴─┴─┴─┴─┴─┴─┘ ကျပ်	C10a
		တစ်လလျှင် └─┴─┴─┴─┴─┴─┴─┴─┘ ကျပ်	C10b
		တစ်နှစ်လျှင် └─┴─┴─┴─┴─┴─┴─┴─┘ ကျပ်	C10c
		မဖြေဆို 88	C10d

Step 1 ကျန်းမာရေးဆိုင်ရာ အပြုအမူများ

ဆေးလိပ်နှင့် ဆေးရွက်ကြီးထွက်ပစ္စည်း သုံးစွဲခြင်းဆိုင်ရာမေးခွန်းများ

	မေးခွန်း	အဖြေ		သင်္ကေတ
20	အခုသင်**ဆေးလိပ်သောက်**ပါသလား။ (စီးကရက်၊ဆေးပြင်းလိပ်၊ဆေးတံစသဖြင့်)	သောက်သုံး 1 မသောက်သုံး 2	*(မသောက်သုံးပါကမေးခွန်း [25]ကို ဆက်မေးပါ)*	T1
21	အခုသင်ဆေးလိပ် **နေ့စဉ်**သောက် နေပါ သလား။	သောက်သုံး 1 မသောက်သုံး 2	*(မသောက်သုံးပါကမေးခွန်း [25]ကို ဆက်မေးပါ)*	T2
22	သင်အသက်ဘယ်နှစ်နှစ်က**စပြီး** ဆေးလိပ် နေ့တိုင်းသောက်သုံးခဲ့ပါသလဲ။	အသက် └─┴─┘ နှစ် *(မမှတ်မိလျှင် 77ကိုဖြည့်ပါ)*	*(စသောက်တဲ့အသက်ကိုသိပါကမေးခွန်း[24]ကိုဆက်မေးပါ)*	T3
23	ဆေးလိပ်နေ့တိုင်းသောက်ခဲ့တာ ဘယ်လောက် ကြာပြီလဲ။ *(ဆီလျော်သည့် အကွက်(၁)မျိုးတွင်သာ ဖြည့်ပါ / မမှတ်မိလျှင် (77)ကိုဖြည့်ပါ)*	နှစ် └─┴─┘		T4a
		လ └─┴─┘		T4b
		ရက်သတ္တပါတ် └─┴─┘		T4c
24	ပျမ်းမျှအားဖြင့် တစ်နေ့ဆေးလိပ် **ဘယ်နှစ်လိပ်**သောက်ပါသလဲ။ *(မသိလျှင် (77)ကိုဖြည့်ပါ)*	စီးကရက် └─┴─┘		T5a
		ပြောင်းဖူးဖက်လိပ်/ပွတ်ချွန်း └─┴─┘		T5b
		ဆေးတံ └─┴─┘		T5c
		ဆေးပေါ့လိပ်/ဆေးပြင်းလိပ် └─┴─┘		T5d
		အခြား └─┴─┘ _____		T5e

	မေးခွန်း	အဖြေ			သင်္ကေတ
25	အရင်ကသင် နေ့တိုင်း ဆေးလိပ် သောက် ခဲ့ပါသလား။	သောက်ဖူး က်ဖူးမသော	1 2	*(မသောက်ဖူးဆိုပါက မေးခွန်း(28)ကို ဆက်မေးပါ)*	T6
26	ဆေးလိပ်နေ့တိုင်းသောက်သုံးခြင်းကို ဘယ်အသက်အရွယ်မှာ ရပ်ခဲ့ပါသလဲ။	အသက် ⌊⌊⌋⌋ နှစ် *(မမှတ်မိလျှင် 77 ကိုဖြည့်ပါ)*		*(မှတ်မိပါကမေးခွန်း(28)ကို ဆက်မေးပါ)*	T7
27	သင်နေ့တိုင်းဆေးလိပ်သောက်သုံးမှုရပ်ခဲ့တာ ဘယ်လောက်ကြာပြီလဲ။ *(ဆီလျော်သည့် အကွက်(၁)မျိုးတွင်သာ ဖြည့်ရန်ပါ။ မမှတ်မိလျှင် (77) ကိုဖြည့်ပါ)*	နှစ် လ ရက်သတ္တပါတ်		⌊⌊⌋⌋ ⌊⌊⌋⌋ ⌊⌊⌋⌋	T8a T8b T8c
28	လောလောဆယ်ဆေးရွက်ကြီးသုံးစွဲနေပါသလား။ (ရှူခြင်း၊ဝါးစားခြင်း၊ငုံခြင်း၊ကွမ်းထဲထည့်စားခြင်း)	သုံးစွဲ မသုံးစွဲပါ	1 2	*(သုံးစွဲပါက မေးခွန်း (31)ကိုဆက်မေးပါ။)*	T9
29	အကယ်၍သုံးနေရင်ဆေးရွက်ကြီးကိုနေ့တိုင်းသုံးစွဲနေပါသလား။	သုံးစွဲနေ မသုံးစွဲပါ	1 2	*(သုံးစွဲပါက မေးခွန်း (31)ကိုဆက်မေးပါ။)*	T10
30	ပျမ်းမျှအားဖြင့် တစ်နေ့မှာ ဆေးရွက်ကြီး ဘယ်နှစ်ကြိမ် သုံးစွဲပါသလဲ။ *(မမှတ်မိလျှင် (77)ကိုဖြည့်ပါ)*	ပါးစပ်ဖြင့်ဆေးရွက်ကြီးရှူရှိုက်		⌊⌊⌋⌋ ကြိမ်	T11a
		နှာခေါင်းဖြင့်ဆေးရွက်ကြီးရှူရှိုက်		⌊⌊⌋⌋ ကြိမ်	T11b
		ဆေးရွက်ကြီးဝါး/ငုံ		⌊⌊⌋⌋ ကြိမ်	T11c
		ကွမ်းယာထဲထည့်စား		⌊⌊⌋⌋ ကြိမ်	T11d
		အခြား		⌊⌊⌋⌋ ကြိမ်	T11e
31	ယခင်ကနေ့တိုင်းဆေးရွက်ကြီးသုံးစွဲဖူးပါသလား။ (ရှူခြင်း၊ဝါးစားခြင်း၊ငုံခြင်း၊ကွမ်းထဲထည့်စားခြင်း)	သုံးစွဲ မသုံးစွဲပါ	1 2		T12

အရက်သောက်ခြင်းဆိုင်ရာမေးခွန်းများ					
	မေးခွန်း	**အဖြေ**			**သင်္ကေတ**
32	အရက်**သောက်ဖူး**ပါသလား။ (ဘီယာ/ဝိုင်/အရက်/ခေါင်ရည်/ကစော်စသဖြင့်)	သောက်ဖူး မသောက်ဖူး	1 2	*(မသောက်ပါက မေးခွန်း42ကို ဆက်မေးပါ။)*	A1a
33	**လွန်ခဲ့တဲ့(၁၂)လအတွင်း** သင် အရက် သောက်ခဲ့ပါသလား။	သောက် မသောက်	1 2	*(မသောက်ပါက မေးခွန်း42ကို ဆက်မေးပါ။)*	A1b
34	လွန်ခဲ့သည့်(၁၂)လအတွင်း **ဘယ်နှစ်ကြိမ်** အရက် သောက်ခဲ့ပါသလဲ။ *(မဖြေနိုင်ပါက အဖြေများကိုဖတ်ပြပြီး ရွေးခိုင်းပါ။)* *(ပုံစံပြကားချပ်များကိုလည်းပြပါ)*	နေ့စဉ်	1		A2
		တစ်ပတ် (၅)-(၆) ရက်	2		
		တစ်ပတ် (၁)-(၄) ရက်	3		
		တစ်လ (၁)-(၃) ရက်	4		
		တစ်လ ၁ ရက်အောက်	5		
35	လွန်တဲ့သည့် ရက်(၃၀)အတွင်း သင် အရက် သောက်ပါသလား။	သောက် မသောက်	1 2	*(မသောက်ပါက မေးခွန်း42ကိုဆက်မေးပါ)*	A3
36	လွန်ခဲ့တဲ့ ရက်(၃၀)အတွင်း အရက် ဘယ်နှစ်ကြိမ် သောက်ခဲ့ပါသလဲ။	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊⌊⌋ ကြိမ်		A4
37	လွန်ခဲ့ တဲ့ ရက်(၃၀)အတွင်း အရက်သောက်တဲ့ အခါ တစ်ခါသောက်လျှင်ပျမ်းမျှစံခွက်ရေဘယ် နှစ်ခွက်သောက်ပါသလဲ။ *(ပုံစံကားချပ်ပြ၍ ခွက်ရေဆုံးဖြတ်ခိုင်းပါ)*	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊⌊⌋ ခွက်		A5
38	လွန်ခဲ့တဲ့ ရက်(၃၀)အတွင်း အရက်သောက်တဲ့ အခါ တစ်ခါသောက်လျှင် အများဆုံး သောက်ခဲ့တဲ့ စံခွက်ရေဘယ်လောက်ရှိပါသလဲ။ *(ပုံစံကားချပ်များဖြင့် စံအရက်ခွက်ပုံများပြပါ)*	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊⌊⌋ ခွက်		A6
39	လွန်ခဲ့တဲ့ ရက်(၃၀)အတွင်း **(ယောကျ်ားများအားမေးရန်)** အရက်(၅)ခွက်ထက်ပိုသောက်တဲ့အကြိမ် ဘယ်နှစ်ကြိမ် ရှိပါသလဲ။ **(မိန်းမများအားမေးရန်)** အရက်(၄)ခွက်ထက်ပိုသောက်တဲ့အကြိမ် ဘယ်နှစ်ကြိမ် ရှိပါသလဲ။	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊⌊⌋ ကြိမ်		A7

40	လွန်ခဲ့တဲ့ ရက်(၃၀)အတွင်း အရက်သောက်တဲ့ အခါတွေမှာထမင်း၊ ခေါက်ဆွဲစတဲ့ဗိုက်ပြည့်တဲ့ အစားအစာတွေနဲ့ ဘယ်နှစ်ခါတွဲစားပါသလဲ။ (အမြည်းစားခြင်းကို မဆိုလိုပါ။)	အမြဲတမ်း 1 တစ်ခါတစ်ရံ 2 မစားသလောက် 3 လုံးဝမစား 4	⌊_⌋⌊_⌋	A8
41	လွန်ခဲ့တဲ့ (၇) ရက်အတွင်း တစ်နေ့ စံအရက်ခွက် ဘယ်နှစ်ခွက်သောက်ပါသလဲ။ တစ်ရက်စီပြောပြပါ။ *(ပုံစံကားချပ်ပြ၍ ခွက်ရေဆုံးဖြတ်ခိုင်းပါ။)* *(မသိလျှင် 77 ကိုဖြည့်ပါ။)*	တနလ်ာ	⌊_⌋⌊_⌋ ခွက်	
		အင်္ဂါ	⌊_⌋⌊_⌋ ခွက်	
		ဗုဒ္ဓဟူး	⌊_⌋⌊_⌋ ခွက်	
		ကြာသာပတေး	⌊_⌋⌊_⌋ ခွက်	
		သောကြာ	⌊_⌋⌊_⌋ ခွက်	
		စနေ	⌊_⌋⌊_⌋ ခွက်	
		တနင်္ဂနွေ	⌊_⌋⌊_⌋ ခွက်	

အစားအစာစားသောက်ခြင်းဆိုင်ရာမေးခွန်းများ

ဆက်မေးမဲ့ မေးခွန်းတွေဟာ ဟင်းသီးဟင်းရွက်နဲ့ သစ်သီးဝလံ သင်ဘယ်လောက်စားလေ့ရှိတယ်ဆိုတာနဲ့ ဆိုင်ပါတယ်။ ပုံစံပြကားချပ်တွေသုံးပြီး စံချိန်မီတစ်ခါပြင်ဟင်းသီးဟင်းရွက်နဲ့ သစ်သီးဝလံပမာဏကိုပြပါမယ်။ မေးခွန်းတွေဖြေတဲ့အခါ အရင်တစ်နှစ်အတွင်းပုံမှန်တစ်ပတ်အတွင်းစားခဲ့ပုံကို စဉ်းစားပြီး ဖြေပေးပါ။

	မေးခွန်း	အဖြေ			
42	တစ်ပတ်လျှင်သင်သစ်သီးဝလံစားတဲ့ရက်ပေါင်း ဘယ်လောက်ရှိပါသလဲ။ *(သစ်သီးဝလံ ပုံစံပြကားချပ်များပြပါ။)*	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊_⌋⌊_⌋ ရက်	*(လုံးဝမစားပါက မေးခွန်း 44ကို ဆက်မေးပါ။)*	D1
43	သစ်သီးဝလံစားဖြစ်တဲ့နေ့တွေမှာတစ်ရက် ဘယ်လောက်စားဖြစ်ပါသလဲ။	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊_⌋⌊_⌋ *(တစ်ခါစားပမာဏဖြင့်)*		D2
44	တစ်ပတ်မှာသင်ဟင်းသီးဟင်းရွက်စားတဲ့ရက် ဘယ်လောက်ရှိပါသလဲ။ *(ဟင်းသီးဟင်းရွက်ပုံစံပြကားချပ်များပြပါ။)*	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊_⌋⌊_⌋ ရက်	*(လုံးဝမစားပါက မေးခွန်း 46 ကို ဆက်မေးပါ။)*	D3
45	ဟင်းသီးဟင်းရွက်စားဖြစ်တဲ့နေ့တွေမှာတစ်ရက် ဘယ်လောက်စားဖြစ်ပါသလဲ။	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊_⌋⌊_⌋ *(တစ်ခါစားပမာဏဖြင့်)*		D4
46	သင့်အိမ်မှာအစားအသောက်ချက်ပြုတ်တဲ့အခါ ဘာစားသုံးဆီကို အဓိကသုံးစွဲပါသလဲ။	မြေပဲဆီ 1 စားအုန်းဆီ 2 မြေပဲ+စားအုန်းဆီ 3 နှမ်းဆီ 4 ဟင်းရွက်ဆီ 5 အခြား 6 ဘာဆီမှမသုံး 7 မသိ 77	⌊_⌋⌊_⌋		*D5*
47	ပျမ်းမျှအားဖြင့် တစ်ပတ်မှာ ဘယ်နှစ်ကြိမ်လောက် အိမ်မှာ ထမင်းမစားဘဲ အပြင်မှာ စားဖြစ်ပါသလဲ။ (မနက်စာ၊ နေ့လည်စာ၊ ညစာစသည်ဖြင့်)	*(မသိလျှင် 77 ကိုဖြည့်ရန်)*	⌊_⌋⌊_⌋ ကြိမ်		D6

ကိုယ်လက်လှုပ်ရှားမှုပြုခြင်းဆိုင်ရာမေးခွန်းများ

ဆက်လက်ပြီးကိုယ်လက်လှုပ်ရှားမှုပြုလုပ်တဲ့အချိန်နဲ့ပတ်သက်ပြီးမေးပါမယ်။မိမိကိုယ်ကိုလှုပ်ရှားမှုများတဲ့သူ မဟုတ်လို့ယူဆပါကလည်းယခုမေးခွန်းတွေကိုဖြေပေးပါ။ပထမဦးဆုံးအလုပ်နဲ့ပတ်သက်ပြီးအသုံးပြုရတဲ့(ကုန်ဆုံးသော)အချိန်ကိုပြောပါ။အလုပ်ဆိုတာမှာဝင်ငွေရတဲ့(သို့)ဝင်ငွေမရတဲ့အလုပ်၊အိမ်မှုကိစ္စတွေ၊အစားအစာစိုက်ပျိုးခြင်း၊ငါးမျှားခြင်း၊အစားအစာရှာဖွေ ခြင်း၊အလုပ်အကိုင်ရှာဖွေခြင်းစတာတွေဖြစ်ပါတယ်။

	မေးခွန်း	အဖြေ		သင်္ကေတ
48	သင့်အလုပ်မှာ ပြင်းပြင်းထန်ထန်လှုပ်ရှားမှုမျိုးအနည်းဆုံး(၁၀)မိနစ်လောက်လုပ်ရတာမျိုးရှိပါသလား။ (အလေးအပင်မခြင်း၊ ကျင်းတူးခြင်းစသည်ဖြင့်) *(ပုံစံပြကားချပ်များပြပါရန်)*	ရှိ 1 မရှိ 2	*(မရှိပါက မေးခွန်း 51ကိုဆက်မေးပါ။)*	P1
49	ပုံမှန်အားဖြင့် သင့်အလုပ်မှာ တစ်ပတ်မှာ ပြင်းပြင်းထန်ထန်လှုပ်ရှားမှု ဘယ်နှစ်ရက်လုပ်ရပါသလဲ။	တစ်ပတ်လျှင် └─┘ ရက်		P2
50	အဲဒီရက်တွေမှာ ပျမ်းမျှအချိန်ဘယ်လောက်ကြာအောင်လုပ်ရ ပါသလဲ။	└─┘└─┘ : └─┘└─┘ နာရီ မိနစ်		P3 (a-b)
51	သင့်အလုပ်မှာ သိပ်မပြင်းထန်တဲ့လှုပ်ရှားမှု(ဥပမာ-လမ်းမြန်မြန်လျှောက်ရခြင်း(သို့)ပေါ့ပါးသောပစ္စည်းတွေသယ်ရခြင်း)မျိုးအနည်းဆုံး၁၀မိနစ်ခန့်လုပ်ရတာမျိုးရှိပါသလား။ *(ပုံစံပြကားချပ်များပြပါရန်)*	ရှိ 1 မရှိ 2	*(မရှိပါက မေးခွန်း 54ကိုဆက်မေးပါ။)*	P4
52	ပုံမှန်အားဖြင့် သင့်အလုပ်တွင် တစ်ပတ်မှာ သိပ်မပြင်းထန်သောလှုပ်ရှားမှု ဘယ်နှစ်ရက်လုပ်ပါသလဲ။	တစ်ပတ်လျှင် └─┘ ရက်		P5
53	အဲဒီရက်တွေမှာ ပျမ်းမျှအချိန်ဘယ်လောက်ကြာအောင် လုပ်ရ ပါသလဲ။	└─┘└─┘ : └─┘└─┘ နာရီ မိနစ်		P6 (a-b)
ဒါ့အပြင်တစ်နေရာမှတစ်နေရာသွားခြင်း(ဥပမာ-အလုပ်သွားခြင်း၊စျေးသွားခြင်း၊ စျေးဝယ်ထွက်ခြင်း၊ ဘုရားသွားခြင်း)နဲ့ပတ်သက်ပြီးမေးပါရစေ။				
54	ပုံမှန်အားဖြင့် သင် တစ်နေရာက တစ်နေရာသွားတဲ့အခါ အနည်းဆုံး(၁၀)မိနစ်ဆက်တိုက်လမ်းလျှောက်ရတာမျိုး စက်ဘီးစီး ရတာမျိုးရှိပါသလား။	ရှိ 1 မရှိ 2	*(မရှိပါက မေးခွန်း 57ကိုဆက်မေးပါ။)*	P7
55	အဲဒီလိုသွားလာခြင်းကို ပုံမှန်တစ်ပတ်မှာ ဘယ်နှစ်ရက်လုပ်ပါသလဲ။	တစ်ပတ်လျှင် └─┘ ရက်		P8
56	ပုံမှန်အားဖြင့် သင် တစ်ရက်မှာ လမ်းလျှောက်တာ(သို့)စက်ဘီးစီးတာကိုအချိန်ဘယ်လောက်ကြာအောင်ပြုလုပ်လေ့ရှိပါသလဲ။	└─┘└─┘ : └─┘└─┘ နာရီ မိနစ်		P9 (a-b)
ဆက်လက်ပြီးအားလပ်ချိန်များတွင်ပျော်ရွှင်မှုအတွက်ဖြစ်စေ၊ကိုယ်ကာယကြံခိုင်ရေး(ဥပမာ-အားကစား)အတွက်ဖြစ်စေပြုလုပ်သောလှုပ်ရှားမှုတွေအကြောင်းပြောပြပါ။				
57	အနည်းဆုံး၁၀မိနစ်လောက်ပြင်းပြင်းထန်ထန်လှုပ်ရှားမှု(ဥပမာ-ပြေးခြင်း/ ပြင်းထန်သောအားကစားပြုလုပ်ခြင်း/ အလေးမခြင်း)ပြုလုပ်လေ့ရှိပါသလား။ *(ပုံစံပြကားချပ်များပြပါရန်)*	လုပ်သည် 1 မလုပ်ပါ 2	*(မလုပ်ပါက မေးခွန်း 60ကို ဆက်မေးပါ။)*	P10
58	အဲဒီလိုလှုပ်ရှားမှုမျိုးကို တစ်ပတ်မှာ ဘယ်နှစ်ရက်ပြုလုပ်ပါသလဲ။	တစ်ပတ်လျှင် └─┘ ရက်		P11

59	အဲဒီလိုလှုပ်ရှားမှုကို တစ်ရက်မှာ ဘယ်လောက် ကြာအောင် ပြုလုပ် ပါသလဲ။	⌊_⌊_⌊ : ⌊_⌊_⌊ နာရီ မိနစ်		P12 a-b
60	သင့်ရဲ့အားလပ်ချိန်မှာ သိပ်မပြင်းထန်သောလှုပ်ရှားမှု (ဥပမာ-လမ်းမြန်မြန်လျှောက်ခြင်း၊ စက်ဘီးစီးခြင်း၊ရေကူးခြင်း)တို့ကို အနည်းဆုံး(၁၀)မိနစ်ခန့် လုပ်ပါသလား။	လုပ်သည် 1 မလုပ်ပါ 2	*(မလုပ်ပါကမေးခွန်း၆၃ကိုဆက်မေးပါ။)*	P13
61	အဲဒီလိုလှုပ်ရှားမှုမျိုးကို တစ်ပတ်လျှင် ဘယ်နှစ်ရက် ပြုလုပ်ပါသလဲ။	တစ်ပတ်လျှင် ⌊_ ရက်		P14
62	အဲဒီလိုလှုပ်ရှားမှုကို တစ်ရက်လျှင် ဘယ်လောက် ကြာအောင် ပြုလုပ် ပါသလဲ။	⌊_⌊_⌊ : ⌊_⌊_⌊ နာရီ မိနစ်		P15 a-b
ဆက်လက်ပြီး လွန်ခဲ့သောတစ်ပတ်အတွင်း **အိပ်ချိန်မှအပ**အလုပ်လုပ်နေတုန်း/အိမ်မှာနေတုန်း/အားလပ်ချိန်တွင်း စားပွဲမှာထိုင်နေခြင်း/မိတ်ဆွေများထံသွားလာခြင်း/စာဖတ်ခြင်း/တီဗွီကြည့်ခြင်း/တို့အတွက်အသုံးပြုတဲ့အချိန်ကို စဉ်းစားပါ။				
63	ပုံမှန်တစ်ရက်မှာထိုင်လျက်/လဲလျက်အချိန်မည်မျှနေ ဖြစ်ပါသလဲ။	⌊_⌊_⌊ : ⌊_⌊_⌊ နာရီ မိနစ်		P16 (a-b)
သွေးတိုးခြင်းနှင့်ပတ်သက်သောရာဇဝင်				
64	သင် ဆရာဝန် (သို့)ကျန်းမာရေးဝန်ထမ်းတစ်ဦးဦးနဲ့ သွေးပေါင်ချိန်ဖူးပါသလား။	ချိန်ဖူး 1 မချိန်ဖူး 2	*(မချိန်ဖူးပါက မေးခွန်း ၇၀ကို ဆက်မေးပါ။)*	H1
65	ဆရာဝန်(သို့)ကျန်းမာရေးဝန်ထမ်းတစ်ဦးဦးက သင် သွေးပေါင်ချိန် တက်နေတယ်(သို့) သွေးတိုးရောဂါရှိ တယ်လိုပြောဖူးသလား။	ပြောဖူး 1 မပြောဖူး 2	*(မပြောဖူးပါက မေးခွန်း ၇၀ကို ဆက်မေးပါ။)*	H2a
66	သင့်မှာသွေးတိုးရောဂါရှိတယ်လို့ပြောတာ လွန်ခဲ့တဲ့ (၁၂)လ အတွင်းကလား။	(၁၂)လအတွင်း 1 (၁၂)လကျော် 2		H2b
67	လွန်ခဲ့သော(၂)ပတ်အတွင်းသွေးတိုးရောဂါနဲ့ဆိုင်တဲ့ဆေး သောက်ထားပါသလား။	သောက်ရသည် 1 မသောက်ရပါ 2		H3a
	သွေးမတိုးအောင်အင်နှလျှော့စားဖို့ညွှန်ကြားခံရဖူးပါ သလား။	ညွှန်ကြား 1 မညွှန်ကြား 2		H3b
	ကိုယ်အလေးချိန်လျှော့ဖို့အကြံပေးခြင်း/ ကုသခြင်း ခံရဖူးပါသလား။	ရှိ 1 မရှိ 2		H3c
	ဆေးလိပ်ဖြတ်ဖို့အကြံပေးခြင်း/ကုသခြင်းခံရဖူးသလား။	ရှိ 1 မရှိ 2		H3d
	ကိုယ်လက်လေ့ကျင့်ခန်းလုပ်ဖို့/ ပိုလုပ်ဖို့အကြံပေးတာ ခံရဖူးပါသလား။	ရှိ 1 မရှိ 2		H3e
68	သွေးတိုးရောဂါအတွက် တိုင်းရင်းဆေးဆရာနဲ့ ပြသဖူး ပါသလား။	ပြသဖူး 1 မပြသဖူး 2		H4
69	ယခုလောလောဆယ် သွေးပေါင်ချိန်တက်ခြင်းအတွက် တိုင်းရင်းဆေး (သို့)ရိုးရာဆေးသုံးနေပါသလား။	သုံးနေ 1 မသုံးနေ 2		H5

ဆီးချိုသွေးချိုရောဂါနှင့်ပတ်သက်သောရာဇဝင်				
70	သင်ဆရာဝန် (သို့)ကျန်းမာရေးဝန်ထမ်းတစ်ဦးဦးနဲ့ ဆီချို/သွေးချိုရောဂါရှိမရှိသွေးစစ်ဖူးပါသလား။	တိုင်းဖူး 1 မတိုင်းဖူး 2	*(မတိုင်းဖူးပါက မေးခွန်း 76 ကို ဆက်မေးပါ။)*	H6
71	ဆရာဝန်(သို့)ကျန်းမာရေးဝန်ထမ်းတစ်ဦးဦးက သင်မှာ သွေးချိုဆီးချိုရောဂါရှိတယ်ဟု ပြောဖူးသလား။	ပြောဖူး 1 မပြောဖူး 2	*(မပြောဖူးပါက မေးခွန်း 76 ကို ဆက်မေးပါ။*	H7a
72	သင့်မှာသွေးချိုဆီးချိုရောဂါရှိတယ်လို့ပြောတာ လွန်ခဲ့တဲ့ (၁၂)လ အတွင်းကလား။	(၁၂)လအတွင်း 1 (၁၂)လကျော် 2		H7b
73	သင်လောလောဆယ် အင်ဆူလင် ထိုးနေရပါသလား။	ထိုး 1 မထိုး 2		H8a
	လွန်ခဲ့သော(၂)ပတ်အတွင်းသွေးချိုဆီးချိုရောဂါနဲ့ဆိုင်တဲ့ဆေးသောက်ရသလား။	သောက်ရသည် 1 မသောက်ရပါ 2		H8b
	သွေးချိုဆီးချိုရောဂါအတွက် အစားအစာစားသုံးပုံနဲ့ ပတ်သက်ပြီး ညွှန်ကြားခြင်းခံရဖူးပါသလား။	ညွှန်ကြား 1 မညွှန်ကြား 2		H8c
	ကိုယ်အလေးချိန်လျှော့ချဖို့အကြံပေးခြင်း/ ကုသခြင်းခံရဖူးပါသလား။	ရှိ 1 မရှိ 2		H8d
	ဆေးလိပ်ဖြတ်ဖို့အကြံပေးခြင်း/ကုသခြင်းခံရဖူးပါသလား။	ရှိ 1 မရှိ 2		H8e
	ကိုယ်လက်လေ့ကျင့်ခန်းစတင်/ ပိုလုပ်ရန်အကြံပေးခံရဖူးခြင်းရှိသလား။	ရှိ 1 မရှိ 2		H8f
74	သွေးချိုဆီးချိုရောဂါအတွက် တိုင်းရင်းဆေးဆရာနဲ့ ပြသဖူး ပါသလား။	ပြသဖူး 1 မပြသဖူး 2		H9
75	ယခုလောလောဆယ် သွေးချိုဆီးချိုရောဂါအတွက် တိုင်းရင်းဆေး (သို့)ရိုးရာဆေးသုံးနေပါသလား။	သုံးနေ 1 မသုံးနေ 2		H10

Step 2 ခန္ဓာကိုယ် တိုင်းတာမှုများ

အရပ်အမြင့်နှင့်ကိုယ်အလေးချိန်

	မေးခွန်း	အဖြေ		သင်္ကေတ
76	တိုင်းတာသူ၏အည္ဆန်းနံပတ်	⌊_⌊_⌊_⌊		M1
77	အရပ်နှင့်အလေးချိန်တိုင်းတာရာတွင်အသုံးပြုသောကိရိယာများ၏အည္ဆန်းနံပတ်	အမြင့်	⌊_⌊_⌊	M2a
		အလေးချိန်	⌊_⌊_⌊	M2b
78	အရပ်	⌊_⌊_⌊_⌊ . ⌊ စင်တီမီတာ		M3
79	ကိုယ်အလေးချိန် *(တိုင်းတာ၍ မရအောင် လေးပါက 666. 6 ကို ဖြည့်ရန်)*	⌊_⌊_⌊_⌊ . ⌊ ကီလိုဂရမ်		M4
80	(အိမ်ထောင်ရှိသောအမျိုးသမီးများအားမေးရန်) သင်ကိုယ်ဝန်ဆောင်ထားခြင်းရှိပါသလား	ရှိ 1 မရှိ 2		M5

ခါးအတိုင်းအတာ

81	ခါးကိုတိုင်းတာရာတွင်အသုံးပြုသော ကိရိယာ၏အည္ဆန်းနံပတ်	⌊_⌊_⌊		M6
82	ခါးအတိုင်းအတာ	⌊_⌊_⌊_⌊ . ⌊ စင်တီမီတာ		M7
83	တင်အတိုင်းအတာ	⌊_⌊_⌊_⌊ . ⌊ စင်တီမီတာ		M8

သွေးပေါင်ချိန်တိုင်းတာခြင်း

84	သွေးပေါင်ချိန်တိုင်းတာရာတွင်အသုံးပြုသော ကိရိယာ၏ အည္ဆန်းနံပတ်	⌊_⌊_⌊		M9
85	လက်မောင်းပတ်အရွယ်အစား	အသေး 1 ပုံမှန် 2 အကြီး 3		M10
86	ပထမအကြိမ်တိုင်းခြင်း	အပေါ်သွေး	⌊_⌊_⌊_⌊ (mmHg)	M11a
		အောက်သွေး	⌊_⌊_⌊_⌊ (mmHg)	M11b
87	ဒုတိယအကြိမ်တိုင်းခြင်း	အပေါ်သွေး	⌊_⌊_⌊_⌊ (mmHg)	M12a
		အောက်သွေး	⌊_⌊_⌊_⌊ (mmHg)	M12b
88	တတိယအကြိမ်တိုင်းခြင်း	အပေါ်သွေး	⌊_⌊_⌊_⌊ (mmHg)	M13a
		အောက်သွေး	⌊_⌊_⌊_⌊ (mmHg)	M13b
89	လွန်ခဲ့တဲ့နှစ်ပတ်အတွင်း သွေးတိုးရောဂါအတွက် ဆရာဝန် (သို့) ကျန်းမာရေးဝန်ထမ်းရဲ့ ညွှန်ကြားချက်နဲ့ဆေးသောက်နေပါသလား။	သောက် 1 မသောက် 2		M14

နှလုံးခုန်နှုန်း (အကယ်၍အလိုအလျောက်တစ်သွေးပေါင်ချိန်တိုင်းကိရိယာကိုအသုံးပြုပါကမှတ်သားရန်)

90	ပထမတိုင်းခြင်း	တစ်မိနစ်လျှင် နှလုံးခုန်နှုန်း	⌊_⌊_⌊	M16a
	ဒုတိယတိုင်းခြင်း		⌊_⌊_⌊	M16b
	တတိယတိုင်းခြင်း		⌊_⌊_⌊	M16c

Step 3 ဇီဝဓါတုဗေဒဆိုင်ရာတိုင်းတာမှုများ

သွေးအချို့ဓါတ်တိုင်းတာခြင်း

	မေးခွန်း	အဖြေ		သင်္ကေတ
91	လွန်ခဲ့သော(၁၂)နာရီအတွင်း သင်သည်ရေမှလွဲ၍ အခြားအစားအစာ(သို့)ဖျော်ရည်စားသောက်မိပါသလား။	ဟုတ်	1	B1
		မဟုတ်	2	
92	ဓါတ်ခွဲကျွမ်းကျင်သူ၏အည္ဆန်းနံပါတ်		⌊_⌋⌊_⌋⌊_⌋	B2
93	အသုံးပြုသောပစ္စည်းကိရိယာ၏ အည္ဆန်းနံပါတ်		⌊_⌋⌊_⌋⌊_⌋	B3
94	သွေးနမူနာယူသည့်အချိန်(၂၄)နာရီအတွင်း ဖြည့်စွက်ရန်။		နာရီ ⌊_⌋⌊_⌋ မိနစ် ⌊_⌋⌊_⌋	B4
95	သွေးအချို့ဓါတ်	မီလီမိုး/လီတာ	⌊_⌋⌊_⌋.⌊_⌋⌊_⌋	B5
		နိမ့်	1	
		မြင့်	2	
		တိုင်းရှုမရပါ။။	3	

သွေးအဆီဓါတ် တိုင်းတာခြင်း

96	ဓါတ်ခွဲကျွမ်းကျင်သူ၏အည္ဆန်းနံပါတ်		⌊_⌋⌊_⌋⌊_⌋	B6
97	တိုင်းတာရာတွင်အသုံးပြုသော ကိရိယာ၏ အည္ဆန်းနံပတ်		⌊_⌋⌊_⌋	B7
98	စုစုပေါင်းကိုလက်စ်စရော	မီလီမိုး/လီတာ	⌊_⌋⌊_⌋.⌊_⌋⌊_⌋	B8
		နိမ့်	1	
		မြင့်	2	
		တိုင်းရှုမရပါ။။	3	

တိုးခဲ့တိုင်းတာခြင်း

99	ဓါတ်ခွဲကျွမ်းကျင်သူ၏အည္ဆန်းနံပါတ်		⌊_⌋⌊_⌋⌊_⌋	B9
100	တိုင်းတာရာတွင်အသုံးပြုသော ပစ္စည်းကိရိယာ၏ အည္ဆန်းနံပတ်		⌊_⌋⌊_⌋	B10
101	ထရိုင်ဂလစ်စရိုက်စ်	မီလီမိုး/လီတာ	⌊_⌋⌊_⌋.⌊_⌋⌊_⌋	B11
102	အိပ်ရှ်ဒီအယ်လ်ကိုလက်စ်စရော	မီလီမိုး/လီတာ	⌊_⌋⌊_⌋.⌊_⌋⌊_⌋	B12
		နိမ့်	1	
		မြင့်	2	
		တိုင်းရှုမရပါ။။	3	

Appendix 4

REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF HEALTH
DEPARTMENT OF HEALTH
NAY PYI TAW

Letter No: Ethical Committee 10/2013(۲۹۹)
Dated: August 6, 2013

The Ethical Committee on Medical Research involving Human Subjects, Department of Health, approves to conduct the following proposed research project.

TITLE:

The prevalence of selected risk factors of non- communicable diseases among 25-74 years old people in urban, Yangon Division, Myanmar

Principal Investigator: Dr. Aung Soe Htet

(Chairman)
Dr. Min Than Nyunt
M.B., B.S., M.Med (Occupational Medicine), DMA, Ph.D (Public Health)
Director General
Department of Health

Appendix 5

Declaration of consent

- I have received information about the health survey on burden of risk factors that can affect the health
- I have known the purposes of study and content of the investigation.
- I agree to I can be contacted and invited to attend a simple physical examination.
- I agree that my blood sample will be used to medical research.
- I agree that the result of health check can be used to medical research.

Please cross out any item or items to which you do not give your consent.

Place ----------

Date ----------

Signature ---------- **Signature of Interviewer** ----------

ကတိဝန်ခံချက်

- မိမိသည်မကူးစက်တတ်သောနာတာရှည်ရောဂါများဖြစ်ပွားစေနိုင်သည့်ကျန်းမာရေးဆိုင်ရာအချက်အလက်များနှင့်ပတ်သက်ပြီးကျန်းမာရေးစစ်တမ်းကောက်ယူမည့်ကိစ္စကို ပြည်စုံစွာ သိရှိထားပြီးဖြစ်ပါသည်။
- သုတေသန၏ရည်ရွယ်ချက်နှင့် ပါဝင်သောစစ်ဆေးချက်များကို သိရှိထားပြီးဖြစ်ပါသည်။
- သုတေသနတွင်ပါဝင်ရန် ဆက်သွယ်ဖိတ်ကြားခြင်း၊စမ်းသပ်တိုင်းတာခြင်းများကိုသဘောတူပါသည်။
- ကျန်းမာရေးဆိုင်ရာသုတေသနအတွက် သွေးဖောက်စစ်ဆေးခြင်းကိုသဘောတူပါသည်။
- စစ်ဆေးတွေ့ရှိသောကျန်းမာရေးအချက်အလက်များကိုသုတေသနစာတမ်းတွင် အသုံးပြုမည်ကိုသဘောတူပါသည်။

သဘောမတူသည်အချက်(သို့မဟုတ်)အချက်များရှိပါကကျေးဇူးပြုပြီး ကြက်ခြေခတ်ပေးပါ။

နေရာ .....

ရက်စွဲ .....

လက်မှတ် ..... မေးမြန်းသူလက်မှတ် .....

Appendix 6

Participant Feedback Form

Dear Mr/Ms……, Date ……..
We thank you very much for participating in the Health survey in ……., at ….., date…….
This study was undertaken in order to gather information on the risk factors for chronic diseases (e.g cardiovascular diseases, hypertension, diabetes etc) in Yangon region.

We would like to provide you with an overview of your results from the physical measurements.

Blood pressure

Systolic: _____ mmHg

Diastolic: _____ mmHg

Blood pressure classification

- ☐ Normal (SBP<140 and DBP<90)
- ☐ Elevated (SBP 140-159 and/or DBP 90-99)
- ☐ Raised (SBP≥160 and/or DBP≥100)
- ☐ Currently on medication

Height Height: _____ cm

Weight Weight: _____ kg

Body Mass Index BMI: _____ kg/m^2

BMI classification

- ☐ Underweight (BMI<18.5)
- ☐ Normal weight (BMI 18.5-24.9)
- ☐ Overweight (BMI 25-29.9)
- ☐ Obese (BMI≥30)

Waist circumference Waist: _____ cm

Hip circumference Hip: _____ cm

We would like to provide you an overview of your result from biochemical measurements. The blood sample was investigated at National Health Laboratory, Yangon.

Fasting blood glucose

Fasting blood glucose: _____ mmol/l

Fasting blood glucose classification

- ☐ Normal (<7.0 mmol/l)
- ☐ Raised (≥7.0 mmol/l)
- ☐ Currently on medication

Total blood cholesterol

Total cholesterol: _____ mmol/l

Total blood cholesterol classification

- ☐ Normal (<5.0 mmol/l)
- ☐ Elevated (5.0-6.1 mmol/l)
- ☐ High (≥6.2 mmol/l)

HDL cholesterol

HDL cholesterol: _____ mmol/l

HDL cholesterol classification

- ☐ Normal (≥1.03 mmol/l for Men, ≥ 1.29 mmol/l for Women)
- ☐ Low (<1.03 mmol/l for Men, <1.29 for Women)

Triglycerides

Triglycerides: _____ mmol/l

Triglycerides classification

- ☐ Normal (<2.0 mmol/l)
- ☐ Raised (≥2.0 mmol/l)

Regards,

Dr. Aung Soe Htet
Principal Investigator
09-31240299
Email: aungsh@gmail.com

ကျန်းမာရေးစစ်တမ်း၏ အစီရင်ခံလွှာ

သို့ နေ့စွဲ .....

ဦး/ဒေါ်.....ခင်ဗျား။

.....နေ့ .....အချိန် .....တွင်ကျင်းပပြုလုပ်ခဲ့သည့် ကျန်းမာရေးစစ်တမ်းကောက်ယူမှုတွင် လူကြီးမင်းမှလာရောက်ပါဝင်ကူညီခဲ့ပါသဖြင့် ကျေးဇူးအထူးတင်ရှိပါသည်။

ကျန်းမာရေးစစ်တမ်း၏ အဓိကရည်ရွယ်ချက်မှာ ရန်ကုန်တိုင်းဒေသကြီးအတွင်း (နှလုံး၊ သွေးတိုး၊ ဆီးချိုအစရှိသည့်) မကူးစက်တတ်သော နာတာရှည်ရောဂါများ ဖြစ်ပွားစေနိုင်သည့် ရောဂါဖြစ်နိုင်ခြေအချက်အလက်များကို သိရှိနိုင်ရန်ဖြစ်ပါသည်။

အဆိုပါကျန်းမာရေးစစ်တမ်းမှလူကြီးမင်း၏ ကိုယ်ခန္ဓာအတိုင်းအတာ ရလဒ်အဖြေများကို အောက်ပါအတိုင်းတင်ပြအပ်ပါသည်။

သွေးပေါင်ချိန် အပေါ်သွေး _____ mmHg

အောက်သွေး _____ mmHg

☐ ပုံမှန် (SBP<140 and DBP<90)

☐ ပုံမှန်ထက်မြင့်နေသည် (SBP 140-159 and/or DBP 90-99)

☐ များနေသည် (SBP≥160 and/or DBP≥100)

☐ လောလောဆယ်ဆေးသောက်နေသည်

အရပ်အမြင့် _____ စင်တီမီတာ

ကိုယ်အလေးချိန် _____ ကီလိုဂရမ်

Body Mass Index _____ kg/m^2

☐ ပုံမှန်ထက်လျော့နေသည် (BMI<18.5)

☐ ပုံမှန်ကိုယ်အလေးချိန် (BMI 18.5-24.9)

☐ ဝသည် (BMI 25-29.9)

☐ အဝလွန်သည် (BMI≥30)

ခါးအတိုင်းအတာ _____ စင်တီမီတာ

တင်အတိုင်းအတာ _____ စင်တီမီတာ

အဆိုပါကျန်းမာရေးစစ်တမ်းမှလူကြီးမင်း၏ သွေးနမူနာကို ကျန်းမာရေးဦးစီးဌာန၊ ပြည်သူ့ကျန်းမာရေးဆိုင်ရာဓါတ်ခွဲဌာန၊ ရန်ကုန်သို့ ပေးပို့စစ်ဆေးပါသည်။ ရလဒ်အဖြေများကို အောက်ပါအတိုင်းတင်ပြအပ်ပါသည်။

သွေးအတွင်းရှိအချို့ဓါတ်(သကြားဓါတ်) (Fasting Blood Glucose) ..... mmol/l

☐ ပုံမှန်(<7.0 mmol/l)

☐ များနေသည် (≥7.0 mmol/l)

☐ လောလောဆယ်ဆေးသောက်နေသည်

သွေးအတွင်းရှိစုစုပေါင်းအဆီဓါတ် (Total Blood Cholestrol) ..... mmol/l

☐ ပုံမှန် (<5.0 mmol/l)

☐ ပုံမှန်ထက်မြင့်နေသည်(5.0-6.1 mmol/l)

☐ များနေသည်(≥6.2 mmol/l)

သွေးအတွင်းရှိ HDL အဆီဓါတ် (HDL) ..... mmol/l

☐ ပုံမှန် (≥1.03 mmol/l (အမျိုးသား), ≥ 1.29 mmol/l(အမျိုးသမီး))

☐ နည်းနေသည် (<1.03 mmol/l (အမျိုးသား), <1.29 (အမျိုးသမီး))

သွေးအတွင်းရှိTriglycerides အဆီဓါတ် (Triglycerides) ..... mmol/l

☐ ပုံမှန် (<2.0 mmol/l)

☐ များနေသည် (≥2.0 mmol/l)

လေးစားစွာဖြင့်

ဒေါက်တာအောင်စိုးထက်
Principal Investigator
09-31240299
Email: aungsh@gmail.com

Appendix 7

SHOW CARDS

Alcohol

One standard drink =

1 Standard measure Of Spirits (30ml)

1 Single measure of bottle of beer (285 ml)

1 Single measure glass of wine (120ml)

Note: net alcohol content of a standard drink is approximately 10g of ethanol. Therefore, local palm juice is considered as beer.

Fruits and vegetables: One standard serving = 80 grams of fruits and/or vegetables

Vegetables

Raw green leafy vegetables	= 1 cup
Other vegetables, cooked or chopped raw	= ½ cup
Vegetable juices	= ½ cup

Fruits

Banana, Apple, Oranges	= 1 piece of medium size fruits
Chopped, cooked, canned fruit	= ½ cup
Fruit juice (not artificial)	= ½ cup

Example for fruits and vegetables





Example for Vigorous Activity at work

Example for Vigorous Activity at leisure time

Example for Moderate Activity at work

Example for Moderate Activity at leisure time

Physical Activity Table

Work related Physical Activity		Leisure/ Spare time related Physical Activity	
Moderate Intensity Activities Make your breathe much harder than normal	**Vigorous Intensity Activities** Make your breathe much harder than normal	**Moderate Intensity Activities** Make your breathe much harder than normal	**Vigorous Intensity Activities** Make your breathe much harder than normal
Examples: • Cleaning (vacuuming, mopping, polishing, scrubbing, sweeping, ironing) • Washing (beating and brushing carpets, wringing clothes (by hand) • Gardening • Milking cows (by hand) • Planting and harvesting crops • Digging dry soil (with spade) • Weaving • Woodwork (chiselling, sawing softwood) • Mixing cement (with shovel) • Labouring (pushing loaded wheelbarrow, operating jackhammer) • Walking with load on head • Drawing water • Tending animals	**Examples:** • Forestry (cutting, chopping, carrying wood) • Sawing hardwood • Ploughing • Cutting crops (sugar cane) • Gardening (digging) • Grinding (with pestle) • Labouring (shovelling sand) • Loading furniture (stoves, fridge) • Instructing spinning (fitness) • Instructing sports aerobics • Sorting postal parcels (fast pace) • Cycle rickshaw driving	**Examples:** • Cycling • Jogging • Dancing • Horse-riding • Tai chi • Yoga • Pilates • Low-impact aerobics • Cricket	**Examples** • Soccer • Rugby • Tennis • High-impact aerobics • Aqua aerobics • Ballet dancing • Fast swimming